▶ EXCLUSIVE

First MAP net to bow

BY BOB WALLACE
Senior Writer

DETROIT — Gould, Inc.'s Industrial Automation Systems division will announce tomorrow the first industrial local-area network that conforms with the Manufacturing Automation Protocol's Enhanced Performance Architecture (MAP-EPA).

The unveiling of Gould's Modbus II is viewed by top MAP officials as important because it marks the first introduction of factory-floor networking equipment can communicate with both full and partial MAP nodes.

Full MAP nodes support all seven layers of MAP version 2.1.

Partial MAP nodes support physical data-link and applications layers of the specification. Modbus

Continued on **page 8**

▶ CORPORATE NETS

New Vtam takes root

BY PAUL KORZENIOWSKI
Senior Writer

A number of large corporations are currently installing the latest release of IBM's Vtam — the backbone of IBM Systems Network Architecture networks — in preparation for the future, rather than as a solution to current Vtam shortcomings. In some cases, the Vtam implementations are going smoothly.

However, network managers with IBM 3705 communications processors may be forced to upgrade to the newer 3725 models, because one extremely critical feature of the most recent version of Vtam cannot be implemented with

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NETWORK WORLD
THE WEEKLY FOR LEADING USERS OF COMMUNICATIONS PRODUCTS & SERVICES VOLUME 3, NUMBER 5 APRIL 7, 1986

▶ DISTRIBUTED DATA PROCESSSING

Alaska users reject data base network

BY BOB WALLACE
Senior Writer

JUNEAU, Alaska — Owing to a bizarre confluence of human, software and communications snafus, an early experiment with distributed data processing is dead in the water, according to its coordinators in the state of Alaska.

The state has halted progress on a lingering five-year old project aimed at providing users with transparent access to remote data. The ill-fated project was crippled by financial and technical problems and an apparent lack of user interest in the advanced data base concept. The software originally purchased for the venture may soon be removed from the state's computers as a cost-cutting measure.

What Software AG of North America, Inc. Chairman John Maguire last week referred to as "one of the most sophisticated distributed data base experiments" — and one the company had cited as a promising example of the concept at work — appears to have been implemented without a specific application in mind. The system has been dormant several years, according to a DP official with the state.

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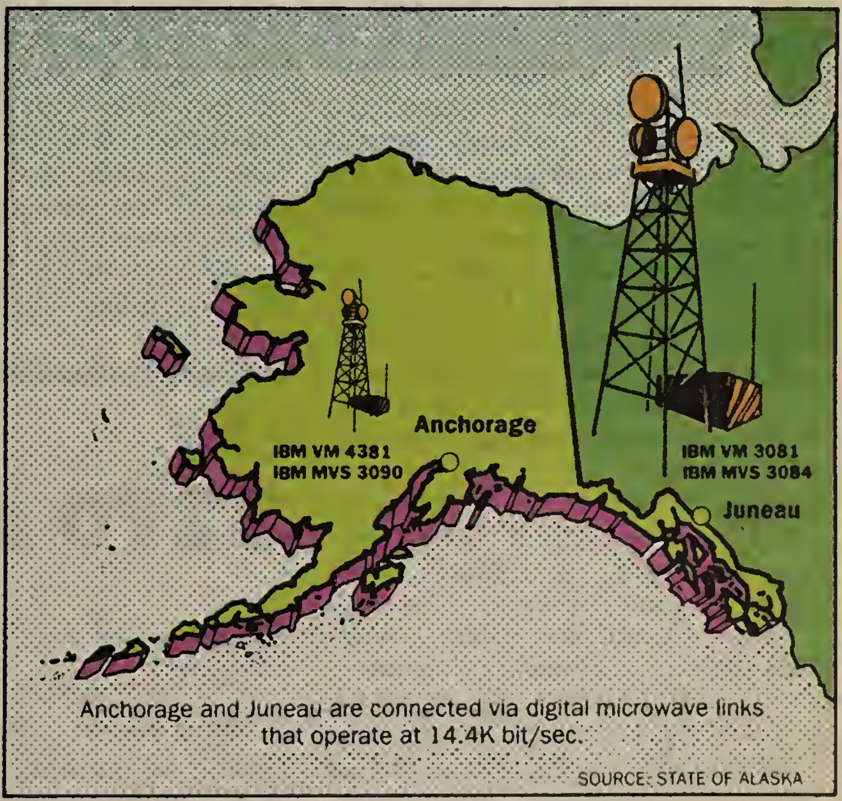
State of Alaska's distributed data base network



Anchorage and Juneau are connected via digital microwave links that operate at 14.4K bit/sec.

SOURCE: STATE OF ALASKA

NETWORK WORLD
News

After sweeping the computer industry, third-party maintenance may catch on in communications. Page 2.

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Traditionally known for embracing new technologies, banks are moving toward ISO/OSI acceptance. Page 2.

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Six months after the IBM Token-Ring Network was introduced, token-ring technology still fights for commercial acceptance. Page 2.

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IBM's spate of product announcements last week included several 3270 emulation enhancements. Page 2.

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Two of AT&T's new PBXs may be locked in a fierce internal marketing battle that only one will survive. Page 4.

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After gaining a formidable reputation in the voice market, MCI is hunkering down with wide-ranging data services. Page 6.

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Pro and Con: The battle rages over certification of communications professionals. Page 22.

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The Corporation for Open Systems picked up another new member in Sun Microsystems. It's new president is also slated to take the reins today. Page 46.

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An energy consulting firm in London puts together a comprehensive network in 16 weeks. Page 26.

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SNA Update: The saga of LU 6.2, SDLC, BSC, DIA, DCA and other Big Blue Acronyms. Page 35.

NEWSPAPER

▶

Users seek solidarity

BY MARGIE SEMILOF
Senior Writer

Communications users groups of every flavor are sprouting up, spreading out and drawing devotees like a new Beverly Hills diet.

Communications managers are anxious to reap the same benefits as their computer users group brethren by signing on with a variety of organizations. In doing so, they hope to gain a better understanding of network operation tools and also to

☞ Continued on **page 39**

▶ MAINTENANCE

Third-party service on rise

BY MARGIE SEMILOF
Senior Writer

Third-party maintenance of communications equipment is an alluring possibility for users — or so vendors think.

In fact, the emerging market for third-party services may be so lucrative that vendors are boning up on local-area networks, private branch exchanges and peripheral communications products with the hope of landing fat maintenance contracts that cover users' entire needs.

While third-party service has long been a mainstay in the computer industry, the concept has only recently begun to take root in the communications arena. Because most large communications equipment, such as PBXs, come with a warranty, many users still rely on manufacturers for service. Many potential customers regard the third-party service idea as interesting, but need more convincing before they are willing to let others maintain their equipment.

The director of information systems at a major New York bottling facility, who declined to be identified, said the idea was worth entertaining, but his firm was more likely to stick with original manufacturer service.

"The manufacturer is more likely to have the trained staff to service equipment, particularly in areas like T-1 multiplexing," he said. "This is brand new gear. I want someone to service the product who hangs around the engineers that built it.

"For some of the older analog products, it may be a great idea," he added.

"On the other hand, it would be great to have one vendor that could find the problem in the overall network. But I'd like to wait to see how the business matures first."

The desire to gain more flexibility in maintenance contract negotiation and put an end to finger-pointing may be enough to make the one-stop service a hit with customers. Users may also save money by allowing vendors to bid on service contracts.

Industry watchers disagree on how much money a user can actually save by using an independent maintenance contractor. Most vendors are willing to negotiate maintenance fees with companies that have large installed bases of equipment.

According to Gary Khedarian, a market analyst with Framingham, Mass.-based International Data Corp., current savings from using a

Continued on **page 41**

▶ FINANCIAL NETS

U.S. banks mull OSI standard as net panacea

BY KARYL SCOTT
Washington, D.C. Correspondent

WASHINGTON, D.C. — The World Bank recently went shopping for a satellite link to connect its headquarters here with Korea. The bank had to deal with eight service and equipment vendors to acquire that link.

Part of the difficulty in securing the link was due to the lack of accepted international standards designed to provide simple, ubiquitous communications.

The World Bank's experience is just one illustration of why the banking industry is moving to support the International Standards Organization's Open Systems Interconnect (OSI) model. "I don't want to have to choose a vendor based solely on whether I can communicate with its products and services," said Howard Conrad, chief of the network communications center at the World Bank. "I want

Continued on **page 43**

▶ NETWORK ALTERNATIVES

Users ponder Token-Ring paths

BY MARY PETROSKY
West Coast Correspondent

In the wake of IBM's announcement that its Token-Ring Network is generally available, personal computer users are taking a closer look at local-area networks that employ token-passing technology. While there has not been a dramatic shift in buying patterns away from existing Ethernet-type networks, many users are implementing products designed to pave the way for IBM's Token-Ring Network, according to network dealers.

"To date, the demand is still for Ethernet, linear-bus networks," said Dennis Passovoy, executive vice-president for DataLAN, Inc., a Canoga Park, Calif., network reseller. Linear-bus networks that use collision detection/collision avoidance schemes continue to be popular because they are technically simpler, less expensive and easier to install than token-passing networks, Passovoy said.

However, IBM's endorsement of token-passing technology has been a boost for vendors using similar technology, many of whom have struggled to convince users of their products' virtues. Nestar Systems,

Continued on **page 42**

▶ IBM

3270 emulation amid Blue moves

BY JOHN DIX
Senior Editor

NEW YORK — Buried in an avalanche of announcements that included the long-awaited IBM laptop Personal Computer, Big Blue last week released enhanced 3270 terminal-emulation software for its Personal Computer family.

The new 3270 emulation programs increase file transfer speed to and from hosts, provide compatibility with IBM Topview and IBM's PC Network and Token-Ring Network and enhance 3270 communications between these local networks and 3270 host environments.

Other communications-related announcements included the IBM Personal Computer Local-Area Network Program Version 1.1, which replaces the IBM PC Network Program to emphasize its compatibility with both IBM local networks and IBM Personal Services/370 Release 2, which is said to simplify Personal Computer use of IBM's Distributed Office Support System/370.

The 3270 program enhancements are of particular interest because they will help further the

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▶ MULTIPLEXERS

Emulex mux ties DEC Unibus minis, up to 144 remote asynch devices

BY MARY PETROSKY
West Coast Correspondent

COSTA MESA, Calif. — Emulex Corp. last week introduced a communications controller that connects Digital Equipment Corp.'s Unibus-based minicomputers with up to 144 remote asynchronous terminals.

The CS41 multiplexer uses a single T-1-type twisted-pair cable to link up to six distribution panels in a ring. Each panel is capable of supporting 24 terminals, according to Norm Kiefer, director of product marketing communications. Data is transmitted at 1.544M bit/sec between distribution panels and the controller. Terminals communicate with distribution panels at speeds up to 9.6K bit/sec.

Emulex plans to use the CS41 as a building block for developing wide-area networks. The company is currently working on a CS41-compatible data switch that will enable end users in the network to access multiple host computers. Kiefer said this switching capability would be available by the end of the year.

Emulex is one of a growing number of local-area network and private branch exchange vendors attempting to solve a common user problem: the need to connect multiple buildings across a single net.

"People have to link terminals on some kind of common network," said Chuck Kanupke, vice-president of telecommunications with Dataquest, Inc. in Marlton, N.J.

The CS41, which allows distribution panels to be spaced at 5,000-foot intervals, simplifies users' cabling arrangements, according to Kiefer. This is not a replacement for Ethernet, but a less expensive wiring alternative, he said.

The primary application for the CS41 is linking terminals within an office building or throughout a campus environment. The CS41 can also be used in conjunction with microwave and infrared links, as well as fiber optics and cable television-type coaxial cable to connect remote panels to the network.

Users wishing to combine synchronous data, voice and video with asynchronous data over a single line must purchase a drop-and-insert multiplexer from another vendor, Kiefer said.

The CS41 subsystem consists of a DEC DMF32-compatible controller, link adapter and remote distribution panels. Emulex is planning to introduce a 12-port panel that will support data rates up to 19.2K bit/sec, according to John Koon, product marketing manager.

Although the CS41 is currently available only for Unibus systems, Emulex plans to support the full DEC line by the end of 1986 or early 1987, Keifer said.

Emulex does not provide controllers for minicomputers from other vendors, but these systems can be added to the network by connecting Emulex's distribution panels back-to-back.

The CS41 subsystem with a single distribution panel and full modem control is priced at $5,500. Additional panels are $3,200.

Emulex Corp., 3545 Harbor Blvd., Costa Mesa, Calif. 92626.

▶ INSIDE AT&T

Low-end PBXs in death struggle?

BY JOHN DIX
Senior Editor

Industry watchers have mistakenly combined the features of two private branch exchanges under development at AT&T Information Systems in widely reported speculation about a soon-to-be-released low-end switch, an AT&T insider confided last week to *Network World.*

Rumors have been flying since AT&T Information Systems filed a Parts 68 document with the Federal Communications Commission a few weeks ago. That filing, required for all devices that can be connected to the telephone network, sparked speculation that the System 25 — little brother to AT&T's current low-end System 75 PBX — was on the way.

Is the System 25's introduction imminent? Well, yes and no, the AT&T insider reported.

Although AT&T is developing a System 25 — also referred to as the X-25 within the company — the FCC filing was for a smaller PBX, code-named Excalibur.

According to the source, Excalibur, scheduled to debut June 17, is a digital PBX that will support from 20 to 120, or 150, lines. The system will be feature-rich and boast some of the popular system

Continued on **page 46**

▶ LOCAL NETS

Banyan adopts Netbios

BY KARYL SCOTT
Washington, D.C. Correspondent

MARLBORO, Mass. — Banyan Systems, Inc. last week became the latest network products vendor to embrace IBM's Network Basic I/O System (Netbios) interface specification with the announcement that its Virtual Networking System (Vines) software now supports Netbios and IBM's DOS 3.10 Personal Computer operating system.

Netbios is a high-level program interface for the Personal Computer that is emerging as a network communications standard. Netbios defines a common set of functions that allow networked programs to communicate with each other. Netbios standardizes the interface between programs and network services and resides conceptually between the session and presentation levels of the International Standards Organization's Open Systems Interconnect model.

Software vendor AST Research, Inc. of Irvine, Calif., was one of the first independent vendors to support Netbios last year. Network vendors Novell, Inc. and 3Com Corp. reportedly also have Netbios emulation products in the works.

Netbios is supported in the latest release, Release 1.3, of Vines, providing naming, datagram and session services. Vines' Netbios naming service allows active programs in the network to identify themselves so they can be found by other programs. The datagram service allows a program to send data to peers on the network with no guarantee that the data will arrive at its destination. Session service supports more reliable communications between two named programs on the network.

The process of registering a Netbios name via a central naming service is faster than on a peer-to-peer network such as the IBM PC Network, according to a Banyan official.

Banyan is supporting the complete set of DOS 3.10 function calls, including locking and default-file locking. Multiuser applications designed to run on DOS 3.10 will run unmodified on the Banyan net. Programs can also operate in single-user mode under Banyan's implementation of DOS 3.10.

Vines pricing begins at $9,000. To get Netbios and DOS 3.10 support, users must purchase a software support contract, which begins at $2,000.

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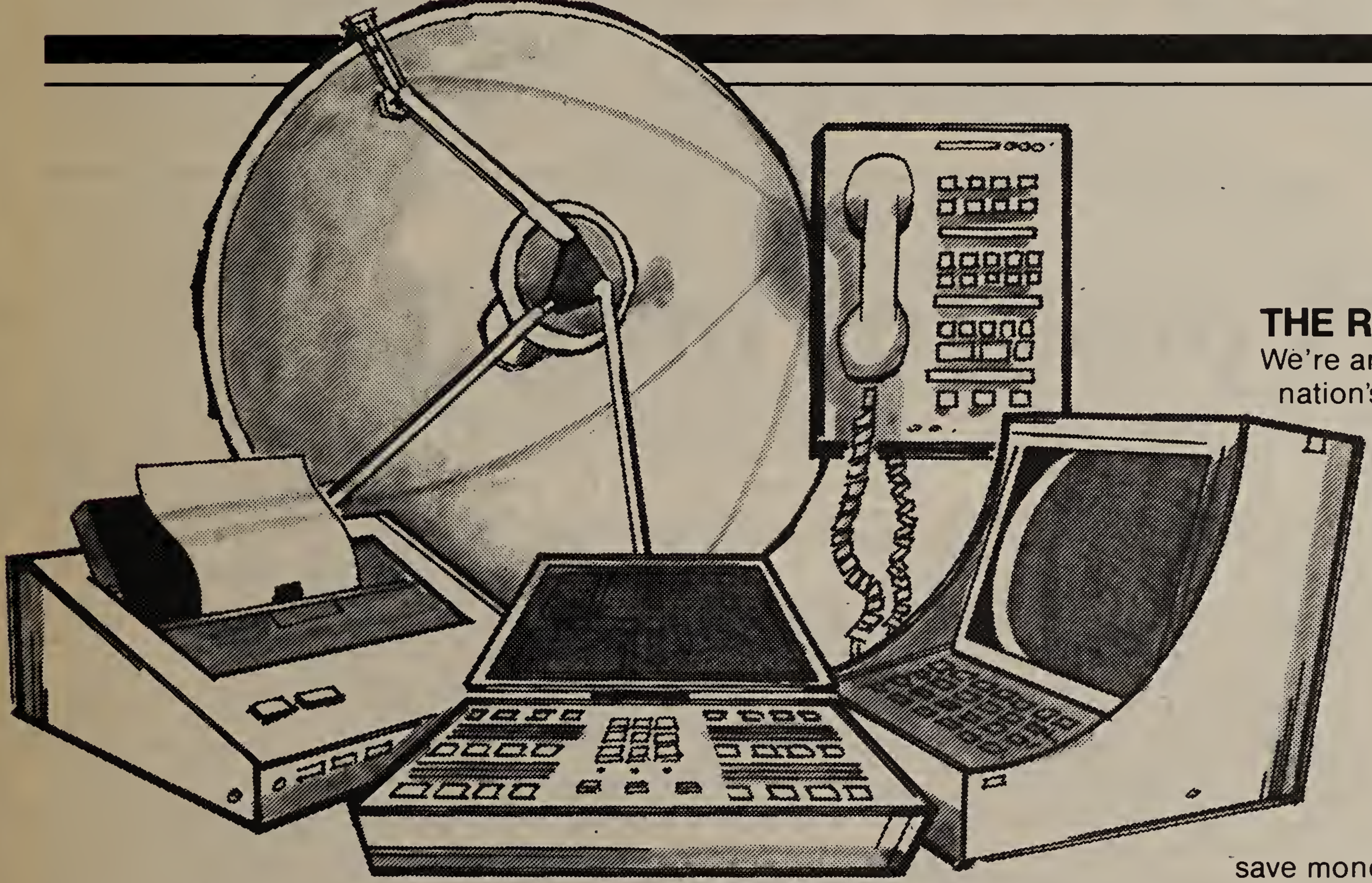

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▶ SOFTWARE

Software Research links to VM, Banyan systems

BY JOHN DIX
Senior Editor

NATICK, Mass. — Software Research Corp. has enhanced its file transfer software by adding support for IBM's VM operating system and network file servers from Banyan Systems, Inc. The original product enabled IBM MVS hosts to control file-swapping among Digital Equipment Corp. and Wang Laboratories, Inc. minicomputers and IBM Personal Computers and compatibles.

Release 1.2 of the Strategic Network Environment/File Transfer Facility (SNE) includes an IBM MVS software module that opens the door to IBM VM/CMS-based mainframes and Banyan local networks. SNE runs as a Vtam application within MVS hosts acting as hubs for other communicating computers. Processors are supported directly or through gateways into their respective environments, according to Stefania Calabi, SNE product director.

DEC systems on a Decnet, for example, can be supported through a gateway using IBM's Binary Synchronous Communications (BSC) protocol.

Interconnected Wang systems can be connected through BSC or Systems Network Architecture 3270 gateways. Release 1.2 patches VM into SNE with IBM's own VM Pass Through facility. Banyan's local network is linked with standard 3270 communications.

SNE supports sequential file transfers between mainframes, minicomputers and personal computers and Vsam index sequential file transfers between mainframes and minis. Vsam files can also be transferred to micros by dropping the index, Calabi said.

The product is said to be the only one of its kind that allows information to be exchanged between any combination of IBM/MVS and VM-based mainframes, DEC and Wang minicomputers, IBM Personal Computers and micro local networks.

SNE is packaged and priced modularly. The initial license fee for MVS hosts is $22,000; for VM hosts, $11,000; $4,000 per minicomputer; and $300 per personal computer.

▶ RESEARCH

IBM runs voice over Token-Ring

BY JOHN DIX
Senior Editor

IBM has built a prototype 4M bit/sec Token-Ring Network in Zurich, Switzerland that supports voice as well as the usual mix of data, according to an article published in the March 1986 *IBM Systems Journal.*

The article, entitled "LAN Experiments by IBM Scientists: Research into High-Speed Communications," was written by Felix

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▶ STRATEGY

MCI, SBS plot for long haul

BY KARYL SCOTT
Washington, D.C. Correspondent

MCI Communications Corp. is waging an aggressive campaign to secure a greater share of the corporate communications market. MCI's tactics in this new competitive battle will include joint marketing forays with IBM, the merging of the network facilities and customers of recently acquired Satellite Business Systems (SBS), the introduction of virtual private networking services — so-called software-defined networks — and the formation of a new national sales force.

With the battle for equal access nearly behind it, MCI is eyeing new opportunities.

"The squeeze on margins from increasing access costs and AT&T's more aggressive pricing policies are forcing MCI to look in other directions," said Joaquin Gonzalez, director of Gartner Group, Inc.'s Strategies in Telecommunications program and a former SBS employee. "With SBS, it may have a chance to go after the larger, more sophisticated corporate customers."

MCI's acquisition of SBS, completed in late February, and its network facilities will help it to further penetrate the toll market and to develop central office-based digital services.

SBS was created a decade ago as a network for large-volume data communications users. SBS later entered the voice market as an adjunct to its original business. MCI has not been as active as SBS in the data communications arena, but the company hopes to leverage some of SBS' expertise.

SBS currently has more data services and greater sales in the high-speed data transmission market than MCI, said Michael Rowny, MCI's senior vice-president of finance.

"We're looking to merge our customer bases and accelerate our penetration of the large corporate market," Rowny said. "Large corporate communications users require data services, and we will be developing more of them as we move forward.

"MCI's goal is to be the primary provider of voice, data and video communications to high-volume users," he added. "While we currently have many large corporate customers, we don't have the major portion of their total communications business."

Part of MCI's game plan is to increase the variety of communications services it offers.

MCI is currently providing a virtual private network service. The Vnet service appears as dedicated private lines to the user, but actually employs the public network. Vnet allows customers to configure the network as needed.

MCI also plans to increase T-1 service offerings as user demand for high-capacity links increases. MCI's deployment of fiber-optic transmission lines will allow the long-distance carrier to satisfy the market's growing need for greater bandwidth and higher speeds.

MCI currently provides MCI Mail, an electronic mail service, DataTransport, a virtual private packet-switched network and DDS, which connects customer sites with long-distance lines.

SBS recently signed a contract with M/A-Com, Inc. for very small aperture terminals, which will give the SBS/MCI team entree to a new segment of the private network market.

MCI's most immediate task is to make SBS profitable. That may prove to be a formidible task. Under IBM ownership, SBS lost an estimated $10 million per month. As part of the acquisition, IBM agreed to assume SBS's $400 million debt, allowing MCI to acquire SBS debt-free.

"One remaining problem is customer acceptance of the migration of [SBS] service to MCI," according to Gonzalez. After all, SBS frequently sold voice services against MCI on the basis of both quality and price.

"IBM's position in MCI may help with the former, and the lack of options should help with the latter," he said.

▶ LONG-HAUL

The IBM connection

MCI Communications Corp. recently announced that it will jointly market products and services with IBM. This is the first direct move IBM has made to move MCI closer to the IBM camp. Despite this announcement, Big Blue seems to be taking a low-key approach to its relationship with the number two long-distance company.

IBM acquired 16% of MCI's common stock in June, with the option of eventually acquiring up to 30%. In return, MCI acquired Satellite Business Systems, Inc. debt-free and $400 million in financing from IBM, possibly in the form of convertible securities.

The most prevalent school of thought suggests IBM intends to exploit the telecommunications market as a major source of income that could offset any downturns in the computer market. The other theory is that IBM is merely answering user demands for end-to-end service, and MCI will provide inexpensive telecommunications as a compliment to IBM's data processing equipment.

There are two possible courses IBM could take in relation to MCI, according to Joaquin Gonzalez, a telecommunications analyst with Gartner Group, Inc., a Stamford, Conn.-based market research firm. In the first scenario, IBM could use MCI as a provider of low-cost transmission services. This would not provide MCI with its desired growth or profit margins.

In the second scenario, IBM and MCI would jointly develop services and equipment. MCI could develop a dynamic, intelligent network, and IBM could continue developing intelligent customer premise equipment. "If MCI is allowed to offer network intelligence rather than just transmission, it will stand to profit," Gonzalez said. "Otherwise I don't see too much potential for MCI."

IBM and MCI still have many obstacles to overcome in working together. IBM's emphasis is on the customer control of equipment.

In the telecommunications world, telephone companies still prefer to exercise control over public networks.

— *Karyl Scott*

Networking Raised to a Greater Power

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Gould from **page 1**

II and enhancements to Gould's 984 programmable controller are scheduled to become available in the third quarter of 1986.

MAP is a seven-layer architecture developed by General Motors Corp. that enables factory equipment produced by different vendors to communicate over a common network. It is a subset of the International Standards Organization's seven-layer Open Systems Interconnect model.

Modbus II is designed to support peer-to-peer communications at 5M bit/sec between programmable controllers. It is not designed, however, to link to larger, faster MAP backbone networks.

The communications product line marketing manager for Gould's Programmable Control division, Bruce McAloney, said the company is looking to vendors such as Concord Data Systems, Inc. and Industrial Networking, Inc. to provide gateway products that will make the Modbus II-backbone MAP net connection. He added that Modbus II will be compatible with the company's current proprietary offering, Modbus, which started shipping in 1979. The company claims to have an installed base of more than 5,000 Modbus networks.

Modbus II is reportedly compatible with so-called Mini-MAP nodes, devices that support MAP Layers 1, 2 and 7. Modbus II consists of a set of local-area network interface products that allow the Gould 984 family of programmable controllers and non-Gould devices to perform distributed processing through the use of a shared communications channel.

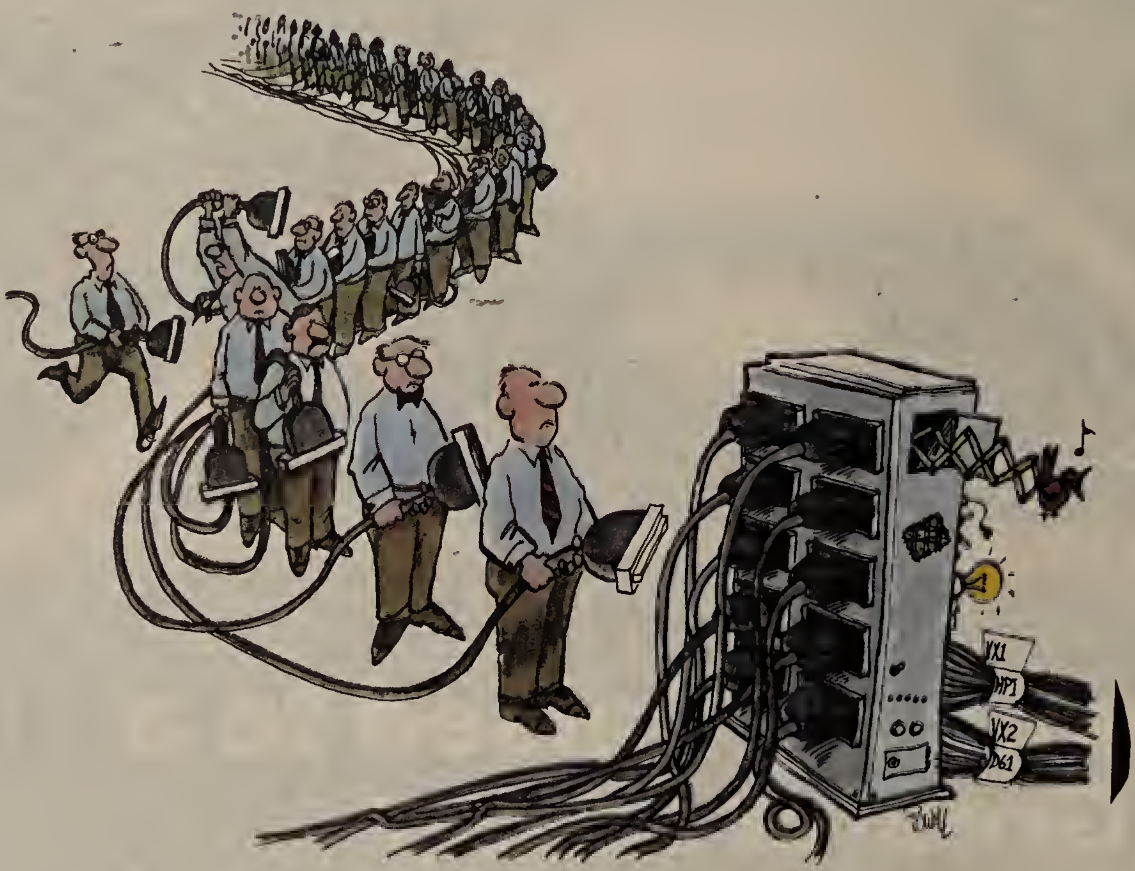
The network features a Gould 984 bus-compatible plug-in module, a Motorola, Inc. 68824 token-bus controller, 512K bytes of random-access memory, an Intel Corp. 80186 processing unit and a built-in carrierband modem.

The company is also planning to introduce several enhancements to its 984 programmable controller. The unit's upgrades include a common power supply, two processing units, a communications processor, two remote I/O processors and a new multioption processor.

The Gould 984 can also be equipped with a software-configurable remote I/O link. Users will be able to downsize the 984 by combining the 984 memory board, communications processor and an S908 I/O processor onto a single board. The Multi-Option Processor combines a 984 power supply chassis and a 16-bit processor to provide a mainframe with 8K bytes of memory, dual Modbus ports and two system option slots.

Support software for the 984 includes a full-function instruction set and a group of software application development tools. These enhancements will allow the user to select programming and documentation to fit the application. The software can run on the Gould P 190 portable programmer, the IBM Personal Computer and compatible units or Digital Equipment Corp. PDP-11 computers. Pricing has not yet been formulated, McAloney said. ◻

> *"Modbus II is designed to support peer-to-peer communications at 5M bit/sec between programmable controllers."*



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INDUSTRY UPDATE

NEC Corp. originated in 1899 as Nippon Electric Co., Ltd., through a joint venture between Japanese investors and Western Electric Co., a subsidiary of American Telephone & Telegraph Corp., to produce telecommunications equipment in Japan.

Koji Kobayashi
From A Vision of Computers and Communications
MIT Press, Cambridge, Mass.

▸ FAX FACTS

Facsimile renaissance

Prices drop as competition grows.

BY SHARON SCULLY
Senior Editor

NEW YORK — Recent developments affecting facsimile equipment users and, consequently, virtually every company on the Fortune 1,000 list, could warrant a closer look at a technology many believe is on its way out.

Here's the good news for users: Prices are continuing to drop, former compatibility problems are almost universally eliminated and standard transmission speeds are down to an average of eight seconds per page. Recent product enhancements have also made personal computer-to-facsimile machine communications possible.

Moreover, last week, for the first time, facsimile equipment users were able to buy a printed phone book of sorts, a listing of facsimile numbers and compatibility information on 27,000 users in the U.S. and abroad.

But what's good for the user isn't always good for the vendor, and most companies in this mature technology market are scrambling to adjust to eroding profit margins and high sales costs.

For example, late last month, Burroughs Corp. announced it would sell its Imaging Systems Division (ISD), Danbury, Conn., to Fujitsu Systems of America, San Jose, Calif., in a $20 million transaction. Rumor had it that the $50 million business, which gave Burroughs third place and a 14% share in the domestic facsimile equipment business, had been on the block for the last four years.

During that period, it underwent at least two complete top-management changeovers, and industry insiders have commented that almost every executive in the facsimile business today learned or earned their credentials doing time at Burroughs.

Stanley Greenfield paid his dues setting up the aforementioned facsimile phone book. The founder of New York City-based FDP Associates, who struggled to gain industry support for his directory, said "the last round of Burroughs management" now heads the Japan-based Maurauta, Inc.

Maurauta previously supplied the facsimile equipment sold by Burroughs and other U.S. companies, but six months ago decided to enter the market directly. Greenfield said that Maurauta had been considered the most likely candidate to buy ISD, which instead was picked up by its current OEM supplier, Fujitsu.

The trend among domestic facsimile vendors today is securing increased and more cost-effec-

Continued on **page 10**

VENDOR VIEW

EUGENE LOTOCHINSKI

CEI's emerging role in enhanced services market

The French painter Edgar Degas was once invited to a special dinner by his friend, the etcher, Jean-Louis Forain. Forain believed in progress. He had recently installed that newfangled invention, the telephone, and arranged to receive a call while Degas was dining. When the phone rang, Forain rushed to answer it, then returned, beaming with pride. Degas, known as a conservative, merely said, "So that's the telephone. It rings and you run."

Forain's early telephone service unfortunately lacked the innovations that have occurred in the telecommunications industry in the last two decades.

Surely even the jaded Degas would have been impressed by voice and text messaging or conference calling, and certainly by the variety of value-added services expected to exist in the future.

Recently, enhanced services and how they can or should be implemented have been causing a stir in the telecommunications industry. One of the issues is Comparably Efficient Interconnection (CEI) and what its acceptance by the FCC would mean to the industry.

Today, many suppliers of telecommunications products and services support competition as one way to encourage innovation in services and features. And all would agree that competition among suppliers must be as fair as possible. Competition has encouraged much of the industry's technological development.

For example, prior to 1968, the user had little control over telecommunications costs and network design, not to mention a limited set of available features.

Competition and the evolution of technology has changed that forever. Today, the business subscriber is offered tremendous control over both private branch exchange and digital Centrex vehicles. And the feature set is almost limitless.

Rapid innovation in the telecommunications industry, however, has created a problem: an excess of possible solutions. Both suppliers and users must weigh the kinds of features and services needed against the technological solutions that are offered.

Adding to this problem is the fact that the monopoly that exists for local telephone service creates a need for regulation. Under regulation, however, almost every proposed new service or feature is presented, argued, judged and decided on individually. And decisions on a case-by-case basis lead to uncertainty, which tends to inhibit innovation.

The solution to this telecommunications industry catch-22 is a balance between competition, which encourages innovation, and regulatory uncertainty, which discourages innovation. The solution might lie in reasonable certainty.

By allowing CEI, the Federal Communications Commission permits telephone operating companies to offer enhanced services only if competitors providing enhanced services are offered interconnections comparable in quality, price and

Continued on **page 10**

CONTRACTS

CUPERTINO, Calif. — Tandem Computers, Inc. announced that the Bank of Tokyo has installed Tandem Nonstop TXP systems in its New York and London branches, which will be linked to a system already in use at the bank's Tokyo headquarters. The systems, part of a new international banking network, will handle funds transfers and facsimile transmission between bank offices. They will also be used to connect personal computers used by the Bank of Tokyo.

BILLERICA, Mass. — Davox Corp. announced a $250,000 agreement to supply 108 of its integrated voice/data workstations to Atlanta-based Equifax, Inc. for use in six of the company's data-gathering and information-processing centers — dubbed Equicenters — nationwide. Workstations will be installed in Equifax's Atlanta support center and in Equicenters in Cleveland, Chicago, Dallas, La Habra, Calif., and Marlboro, N.J.

SCOTTSDALE, Ariz. — Vodavi Technology Corp. announced an agreement with PacTel Communications, a Pacific Telesis company, to market telephones and other telecommunications equipment. Under the terms of the venture, called Pactel Products, most of the equipment will be manufactured in South Korea, where the companies can access AT&T patents.

CEI from **page 9**

location. In effect, then, the FCC would agree that telephone companies and others will compete fairly to provide enhanced services. And fair competition leads to reasonable certainty.

There are many questions concerning CEI. Is it possible? What is the cost in comparison with collocated servers? Is it really comparable in terms of quality?

Implementing a given service, for example, may or may not require some external engine, or a value-added server (VAS). And a VAS implemented in order to provide a particular service may or may not be used to provide other services.

Competitors may choose to mix different services on their value-added engines. Some services could be very tightly integrated into the basic telecommunications network. Others may, for various reasons, need to be somewhat more loosely coupled. The path of innovation in the telecommunications industry — particularly how competitors are going to implement services and capabilities that are yet to be invented — is impossible to predict.

Instead, what is possible is to ensure that competition can prevail, and that innovation can in turn take place.

The FCC's acceptance of CEI will remove some of the regulatory uncertainty and will encourage competition in telecommunications, development of new services and improvement of the competitiveness of business in the U.S.

Lotochinski is vice-president, market development, Northern Telecom, Inc., Nashville, Tenn.

> *"Competitors may choose to mix different services on their value-added engines. Some services could be very tightly integrated into the basic telecommunications network. Others may, for various reasons, need to be somewhat more loosely coupled."*

Facsimile from **page 9**

tive distribution channels. According to Stanley Newbury, an analyst with the San Jose, Calif.-based Dataquest, Inc., large U.S. corporations are finding profit margins in the facsimile equipment market unacceptable.

A recent study by Dataquest showed Ricoh leading the 1984 domestic facsimile market with a 17% share. Following, in descending order, were Pitney Bowes, Inc. (15%), Burroughs (14%), 3M Corp., Xerox Corp. and Panafax (10% each) and all others (23%). When the 1985 results are in, that scenario is expected to show a ranking of Ricoh Corp., Pitney, Canon USA, Inc., Panafax, NEC Corp., Xerox, Burroughs and Teleautograph Corp.

"In 1985, the winners were the companies that aggressively bought distribution outlets and realized that the facsimile machine has become a commodity product, very similar to photocopy machines, which must be sold through similar low-profit margin outlets," Newbury said.

According to Dataquest, 157,000 facsimile machines were installed in 1985, 206,000 are projected to be installed this year, and 390,000 in 1990, something on the order of 17% growth per year. Meanwhile, as the dollar volume of these shipments grows, prices are going down because of increased competition. For 1984, Dataquest reported the average total-dollar revenue for industry shipments at $605 million. Those projected figures for 1985 and 1990 were $740 million and $1.2 billion, respectively, or roughly 13% average growth per year.

Other recent developments with profound impact on the facsimile business include AT&T Information Systems' agreement last year to sell Ricoh equipment through its domestic distribution channels, the sale of Exxon's facsimile business — trade-named Quip — to Lanier Business Products, Inc. and the subsequent purchase and merger of Lanier by Harris Corp.

Interestingly, when AT&T Information Systems announced its entry into the facsimile market last year, it took steps to quiet the news that its product line was being supplied by Ricoh, now a direct competitor.

NEC, another big player in the domestic facsimile market, also is looking to expand its distribution channels, and, according to Dataquest's Newbury, is currently "investigating certain [specific] dealer networks." The company sells direct, and also has major resale agreements with Telecom Plus International, Long Island City, N.Y., and several regional Bell operating companies.

Xerox, which manufactures facsimile equipment in Japan through a joint venture agreement with at least one Japanese manufacturer, sells direct and also has a resale agreement with the procurement subsidiary of the Chicago-based Ameritech, Inc.

Other current developments, such as the introduction and proliferation of high-speed personal computer-to-personal computer communications and electronic mail services, are having an impact on vendors because they mean increased competition and new markets.

Not only will overnight document delivery services such as those offered or planned by MCI Communications Corp., Federal Express Co., and DHL Worldwide Courier Express bite into facsimile transmissions from the users' own premises, but because such services actually use facsimile equipment, they are opening a new end-user market as well.

One company that has introduced technology that makes possible facsimile transmission from personal computers to facsimile machines is Gamma Technology, Inc., Palo Alto, Calif., which in January announced Gammafax, communications boards and software to allow Ascii files or graphics files to be sent via telephone line. When a personal computer is receiving page images from a facsimile machine, the Gammafax package allows the personal computer to store the images as files on a disk, according to the company. The package, which sells for $2,490, also allows facsimile machines to double as local printers for personal computers.

TITN, Inc., Hayward, Calif., also is selling software that allows personal computer-to-facsimile communication. Both companies state that their products will create demand for a kind of facsimile server, for personal computers on a local-area network.

Two other factors spurring change and, some say, demand, in the facsimile business are compatibility among all vendors' machines and the availability of a printed facsimile number directory in the domestic market.

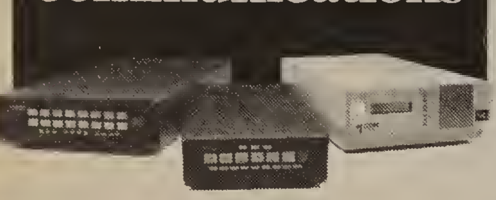
Not only are all current so-called Group 3 facsimile machine manufacturers required to meet certain Consultative Committee on International Telephony and Telegraphy standards for compatibility, but CCITT has already recommended a standard for facsimile under integrated services digital networks.

According to its publisher, Greenfield, work on the first edition of the facsimile users directory began four years ago and was an uphill battle all the way.

"Fifteen years ago, when Xerox *was* facsimile, Xerox did a facsimile directory listing numbers for all its users," Greenfield said. "The day it came out, it became a prospect list for the competition because, then, the best way to sell a facsimile machine was to find a user of someone else's equipment and trade it out," Greenfield said. "Until last year, when the equipment got lighter, cheaper and faster, it was a very competitive marketplace and the main selling emphasis was on piracy."

While AT&T, before divestiture, might have published a facsimile directory, Greenfield said that the company "never did anything on a national level, except make money in the securities markets." He also said that since the divestiture, U.S. District Court Judge Harold Greene's Modified Final Judgment precluded AT&T from entering the directory publishing business.

Citing the fact that "there are more fax machines out there than telex terminals," Greenfield called the facsimile business "the most underpromoted communications medium in history." He said the directory, which the company is selling direct for $55, should spark demand for facsimile machines as well as long-distance transmission services.



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>
> **Donald G. Prigmore,** president, GTE Sprint Communications Corp.

▶ SOFTWARE SERVICES

Download scheme out

GTE Telenet testing electronic software distribution aimed at replacing unwieldy diskette mailing.

BY JOHN DIX
Senior Editor

ATLANTA — GTE Telenet Communications Corp. is testing a communications service for the electronic distribution and management of personal computer software that may ultimately provide the controls needed to spur lagging site licensing agreements.

Provided via GTE Telenet's packet-switched network, PC SUNet can be used to download proprietary corporate software, software updates and site-licensed software packages to IBM and IBM-compatible personal computers, according to Mark Emory, director of GTE Telenet's integrated services. Today most large corporations distribute new software, software fixes and updates by mailing diskettes.

GTE Telenet is hoping to make a success of electronic software distribution in the corporate world, after companies with similar services have failed in the consumer marketplace, Emory added.

With PC SUNet, corporate users load software into a GTE Telenet host, where it is held in either a software library for common access or readied for distribution. End users then access the software by loading PC SUNet communications software into their micros and calling the central data base via GTE Telenet, at speeds ranging from 300 bit/sec to 4.8K bit/sec.

Automating the process of distribution makes new applications feasible, Emory said. One customer is interested in using PC SUNet to distribute monthly updates for a proprietary inventory control package and for adding new applications on a quarterly basis.

The most promising use of PC SUNet may

Continued on **page 12**

CROSS TALK

JOHN DIX

Network dis-integration

Only a few years old, network management and control is surfacing as the driving force behind new communications products and services and one of the primary motivations to install private networks. The onslaught of management systems, however, is creating integration problems.

In the two years since AT&T divestiture, users have scrambled to institute management and control systems to contend with the now-fractured Bell System.

Most management systems are modem-based, enabling communications managers to determine what, where and when net problems occur. Fewer systems offer the associated control capability to bypass failed links and components.

While these systems have helped stabilize the problem-ridden environment created by divestiture, they typically only address the modems and the links. At the recent Interface '86 show, new micro-based products were unveiled. These products extend management functions to other network devices, such as matrix switches and multiplexers.

Now many customers are considering the next logical step, which is constructing networks of their own that provide the highest degree of management and control.

Two of the hottest topics at Interface '86 were packet switches and T-1 multiplexers, devices that can be used as hubs in large private networks. While significant in their own right, new products in both categories shared one common thread: network management and control.

According to some network architecture gurus, future networks will be made up of T-1 or packet-switched backbone nets that interconnect regional subnets, preferably contained within local access and transport areas. One of the problems that may emerge in the migration to this environment is how to integrate the various patchwork management and control systems put in place along the way.

Today, for example, a company may have a modem-based management system controlled by a stand-alone supermicrocomputer and one or two administration terminals. Multiplexers and matrix switches in the network may be monitored through a separate system. If this equipment is relegated to a subnetwork environment

Continued on **page 12**

AT&T sales by division 1984, 1985 and 1990

	(millions of dollars)		Projections 1990	
Division	1984	1985	High	Low
AT&T Communications, Inc.	14,403	15,762	21,142	18,179
AT&T Information Systems	10,496	10,255	9,553	7,104
AT&T Network Systems	8,299	9,850	12,442	9,933
Sales to AT&T Communications	(1,545)	(2,455)	(3,000)	(2,500)
*AT&T Teletype	580	320	0	0
AT&T International	650	740	2,556	1,935
Others	306	592	600	300
Total	33,188	35,064	43,293	34,951

* AT&T Teletype was transferred to AT&T Information Systems in May 1985.

SOURCE: NORTHERN BUSINESS INFORMATION, NEW YORK

▶ NET SOFTWARE

Smart net version ships

BY JOHN DIX
Senior Editor

LENEXA, Kan. — Innovative Software Co. recently announced it has begun shipping the multiuser version of its integrated business application. In addition, the company signed a distribution agreement with AT&T Information Systems.

The Smart Software System is the first multiuser integrated business program available for local network use, Innovative claims. The application includes modules that also are sold on a stand-alone basis and include the Smart Data Manager, Smart Word Processor and Smart Spreadsheet with Graphics.

Smart Multiuser Version 3.0 for local networks is said to be compatible with all DOS 3.1-compatible network operating systems, including Novell, Inc.'s Netware, 3Com Corp.'s 3Plus, IBM's PC Network and AT&T's Starlan.

Innovative's solution to the multiuser pricing quandary is a suggested retail price of $1,795 for up to three users, and $595 for each additional user or workstation.

Innovative also announced a distribution agreement with AT&T Information Systems that calls for AT&T to market Innovative's products to users of its 7300 and 6300 Plus IBM-compatible micros. The software will be marketed under both companies' labels.

Innovative is located at 9875 Widmer Road, Lenexa, Kan. 66215.

PC SUNet from **page 11**

prove to be a function that enables corporations to restrict access to programs in their application libraries.

Once a user has downloaded a program, he can be prevented from using it again until he has reaccessed a GTE host and requested a key. Downloading the key establishes a record of use, the information typically required by third-party software vendors for site licenses.

> *“Corporations can use PC SUNet to distribute test versions of programs and later sell micro applications to users.”*

To date, lack of accurate usage data has hampered electronic distribution as a method for site licensing of such software.

Besides enabling users to share licensed software for occasional use, corporations can use PC SUNet to distribute test versions of programs and later sell micro applications to users, if desired, by charging the purchase to the customer's credit card.

Applications laden with user data, such as spreadsheets, can be accessed by other micro users after they are sent into a centralized library. Additional users can then access the application by downloading the file.

PC SUNet carries a $100 registration fee per end user and a monthly minimum connection fee of $16, Emory said. The one-time host connection fees are discounted as the number of users increases, but the cost averages $40 per user.

In another announcement, GTE Telenet unveiled a hard copy delivery option for its Telemail Xpress electronic mail service.

Fourteen Telemail printing sites have been established around the country to feed laser-printed documents into the U.S. Postal system near the destination point.

The option can be used for individual letters, mass mailings using mailing lists maintained within Telemail or smaller mailings using segments of larger lists. All documents can be printed on letterhead with a an accompanying logo and signature.

The service option is available with a flat, per-letter charge ranging downward from $2, depending on volume, or on a contractual basis, where the user contracts for a number of letters per month.

Disintegration from **page 11**

when a backbone net is put in place, the number of management and control systems would again be increased.

The problem is exacerbated when the computer environment is folded into the picture. Front-end processors have their own management and control systems that must be taken into account. And computer-based management systems such as IBM's Network Communications Control Facility offer yet another management element.

Ultimately, these systems will be integrated into two possible environments: one for network operations that integrates management and control of all network components, including modems, multiplexers and switches; and one for the application environment, characterized as a host-based software system.

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DATA DELIVERY

"Some companies are currently selling their T-1 multiplexers by mail order. Next, they may try to move their products through Sears Roebuck & Co."

William Flanagan
strategic marketing manager
Timeplex, Inc.
Woodcliff Lake, N.J.

▶ MICRO-MINI LINKS

2-in-1 tools

Early users high on Prime PC, terminal.

BY PAUL KORZENIOWSKI
Senior Writer

Two-for-one sales have proven to be very popular among consumers. In February, Prime Computer, Inc. applied the concept to the computer marketplace with the announcement of two products that meld the capabilities of an IBM Personal Computer and a Prime PT200 terminal.

One product, Primelink, supports terminal-emulation-based file transfers between an IBM Personal Computer and a Prime 50 Series superminicomputer. The second offering, PC Option, enables a Prime PT200 terminal to run IBM Personal Computer software and to transfer data to IBM micros.

Early users contacted by *Network World* were pleased with both products' capabilities and cited few shortcomings.

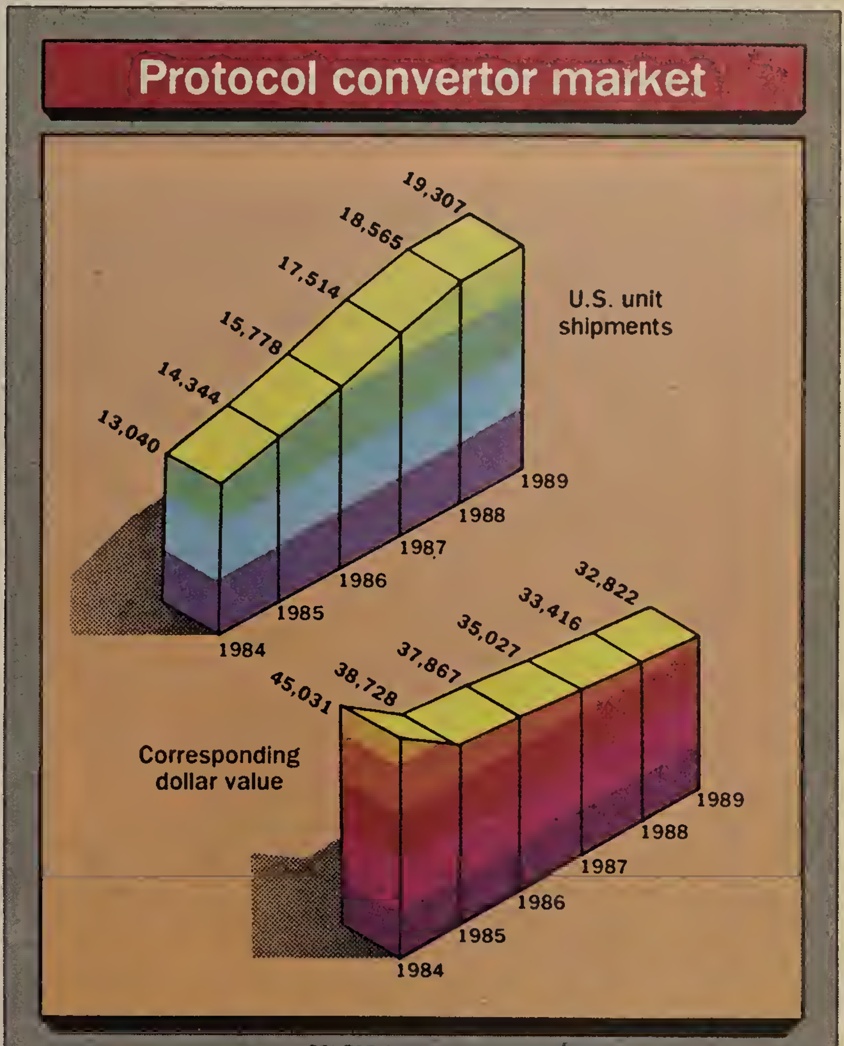
Dave Crisom is chief of the technical support and operations branch of the division of data processing at the Department of Energy's Western Area Power Administration in Goulden, Colo.

The Power Administration supplies electrical power to 13 western states. Crisom's group supports approximately 100 micros, 800 terminals, 25 Prime 50 Series superminicomputers and three Digital Equipment Corp. VAX series superminis.

The Power Administration began testing the Prime products in October. Crisom welcomed the products, but he wished they had come along sooner. "Last summer, our users began asking for links to larger computers," he said.

Before the company implemented the

Continued on **page 14**


Protocol convertor market

SOURCE: INTERNATIONAL DATA CORP., FRAMINGHAM, MASS.

DATA DIALOGUE
BY GABE KASPEREK

Analyzing data analyzers

Second of a two-part series.

In last week's column, three items were discussed that a company should be aware of when choosing a data analyzer. This week, eight more criteria will be discussed.

4. *Storage techniques.* All data analyzers have some memory that can be used to store data. Traps minimize the amount of memory needed.

When certain character sequences appear on the analyzer's send/receive side or leads on the interface change status, a data analyzer will begin to trap information.

Interactivity can be accomplished with the use of traps. If an event occurs, the data analyzer will trap on this event and follow with a transmitted message.

Because of traps, large buffers are not required, reducing cost. Many hand-held data analyzers have only 2K bytes of buffer space. Again, practically all that is needed is some buffer space for capture purposes, writing of transmitted messages and developed programs.

Without the use of traps, operators would spend a a great deal of time scrolling through a small buffer of only 2K bytes.

For ease in use of data analyzers, storage of often-used command setups and tests is desirable. A suitable storage mechanism is electrically erasable programmable read-only memory (Eeprom). These stored programs will be retained even upon power down. This is a low cost replacement for floppy disks. Many vendors supply 4K to 8K bytes of Eeprom with additional cartridges that can store up to 32K bytes.

When greater storage is required, a floppy disk can be used to store up to 700K bytes of data on a 3.5-inch floppy disk.

5. *Remote control.* Most companies choose one type of data analyzer and use it in all of their offices.

Since all locations have the same equipment, a remote control facility can send data up and down various lines, load programs and capture buffers.

Remote control can be easier to use. For example, through a matrix switch, an operator in one location can test a port connected to a data analyzer in a second place. The operator can then conduct or monitor interactive tests.

6. *Hard copy.* A data analyzer must be able to print information stored in its capture buffer. Fingerpointing can be eliminated when hard copy can be handed to uncooperative vendors.

7. *Upgrading.* Many vendors have not designed their products in modular fashion. If a company discovers the need for a floppy disk, it may have to purchase another box.

Modularity enables a user to tailor the product to his needs. Ideally, one box purchased at $3,500 can be upgraded to support features that may cost $20,000.

8. *Automonitoring.* When an automonitoring key is struck, a data analyzer will automatically load tests for a particular format

Continued on **page 14**

Gabe Kasperek is president of Kazcom, Inc., a Park Ridge, Ill., consulting firm that specializes in network management.

PRODUCTS & SERVICES

Modems out

Anderson Jacobson, Inc. announced two 4.8K bit/sec modems that feature automatic dial backup.

The full-duplex AJ 4048-2 and AJ 4048-2EC support asynchronous and synchronous communications over two-wire dial-up, two-wire leased and four-wire leased lines.

In leased line mode, the product can be programmed to automatically redial a lost connection.

The modems include a multilevel security option with four parameters. These parameters include: no security, password required, limited access and supervisor access.

They also include a supervisor function that can work with all the modem functions.

The AJ 4048-2 costs $1,995, and the AJ 4048-2EC costs $2,345.

The products are compatible with an earlier model, the company's AJ 4048.

The AJ 4048 was first introduced in 1982.

Anderson Jacobson, Inc., 521 Charcot Ave., San Jose, Calif. 95131 (408) 263-8520. ☐

Prime from **page 13**

package, Power Administration users had to tinker with various communciations software to complete a file transfer. "Once a file had been sent, a user had to examine the data and clean it up before the data could be used with any application package," Crisom said.

Primelink, which requires both host and personal computer software, eliminates this time-consuming problem. "Our users don't want to spend a lot of time formatting data," Crisom said.

Crisom said that a number of PT200 terminal users use PC option, which boasts an Intel Corp. 8088 microprocessor and IBM's PC-DOS operating system, version 2.1. In the power billing department, for example, an employee could take information stored on a superminicomputer data base, load the data into a microcomputer spreadsheet and produce a number of ad hoc reports, Crisom added.

Crisom reported that PC Option ran all IBM Personal Computer software that the Power Administration tested. The only fault Crisom listed was PC Option's price. "The PC Option would be more attractive if it was priced as low as a personal computer," he said. The option costs at least $4,000.

To link IBM Personal Computers to Prime superminicomputers in the past, Mike Hughes, senior manager of computer services at Malcolm Pirnie, Inc., a private environmental engineering firm in White Plains, N.Y., had his technical staff write a file transfer program. Last fall, the company, which runs six Series 50 minicomputers, began a beta test of the Prime products.

Generally, Hughes was enthusiastic about the products. With more than 50 IBM Personal Computers and 20 PT200 users, he understands that users want to use only one terminal to access both systems.

He was impressed with the PC Option's ability to support a personal computer and PT200 session simultaneously.

The only problem Hughes listed was the product's file transfer speed, 4.8K bit/sec. "When users are working with large file transfers, they need transmission speeds faster than those that the product supports." ☒

Data analyzer from **page 13**

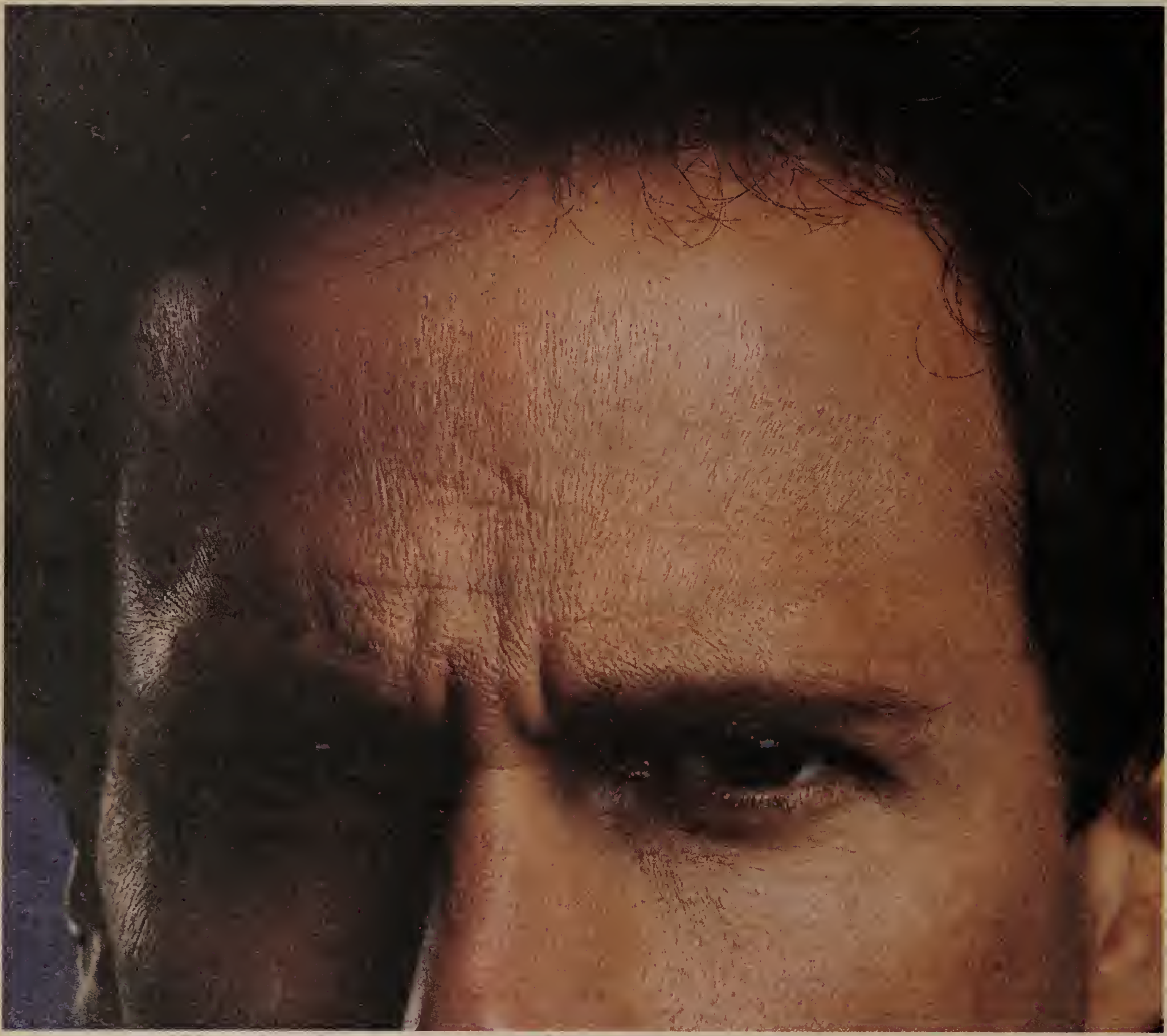
or protocol and monitor a line's data. This key often saves a great deal of set-up time. The reliability of many auto-monitor keys leaves a lot to be desired. Most data analyzers do not properly analyze data formats and often an operator is surprised by test results. A better method to cut start-up time is by storing setup routines and programs in Eeprom or on floppy disk and invoking those routines at a test start.

9. *Performance analysis.* Some data analyzers offer performance monitoring options. Currently, a few data analyzers display statistical information in text or graphics form that help to evaluate network performance items, such as response time and link utilization. These devices cost approximately $20,000 and may be cheaper to purchase than a data analyzer and a performance analyzer.

10. *Physical dimensions.* Data analyzers come in various sizes: hand-held, usually weighing less than three pounds; portable data analyzers other than hand-held devices that weigh less than 25 pounds; and devices weighing more than 25 pounds, which are typically found in a network control center.

Generally, the lighter and more portable the test equipment, the greater the likelihood of a trade-off of functionality and ease of use for physical dimensions. Typically, they cannot provide a full CRT screen or extensive data storage. In some instances, an operator may not require these features.

11. *Cost.* A full function data analyzer can usually be purchased for less than $6,000. ☒



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FACTORY COMMUNICATIONS

> *"MAP will help U.S. manufacturers become more competitive. There's no question that we have a tough time competing with the Japanese."*
>
> **John Mearman**
> U.S. Department of Commerce
> Washington, D.C.

▶ STANDARDS

MAP impact

Process firms eye standard's future.

BY BOB WALLACE
Senior Writer

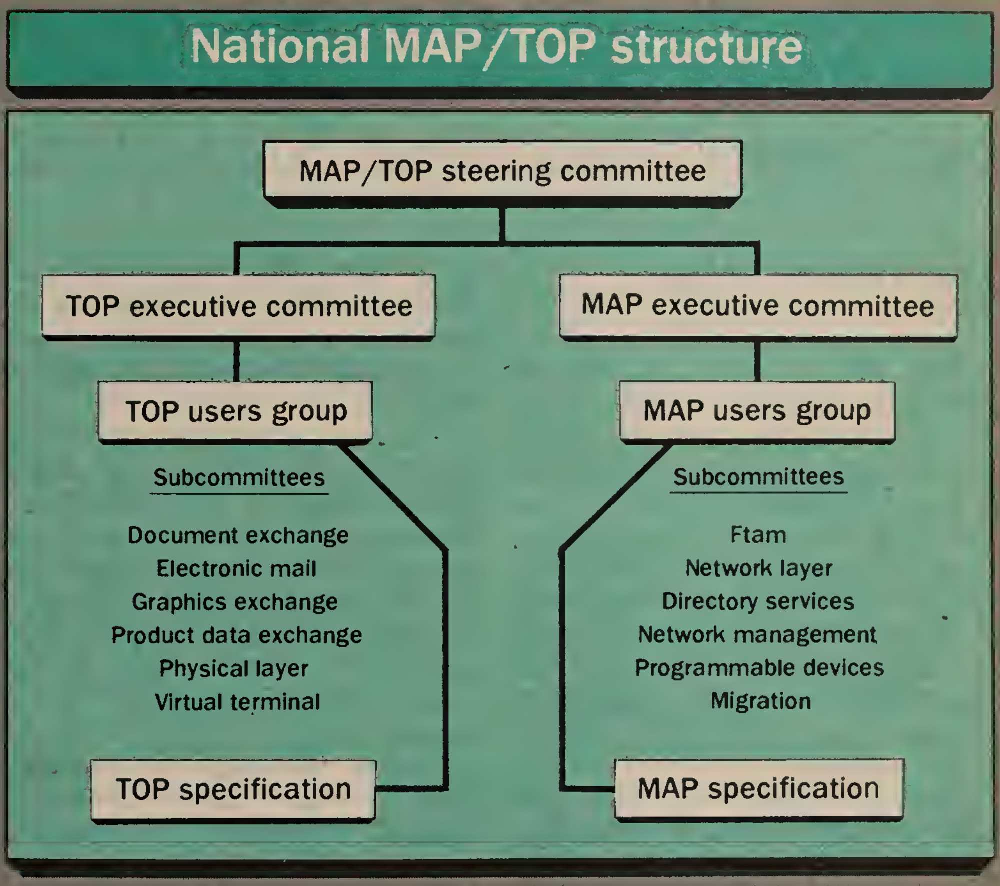
Representatives from some of the nation's largest process manufacturing companies are putting together a white paper that explores how the emerging Manufacturing Automation Protocol (MAP) will impact their industry.

Proctor & Gamble Co., EI DuPont Co., Exxon Corp., Weyerhaeuser Co., InLand Steel Co. and Tennessee Eastmann Co. are just a few of the members of the fledgling MAP Process Industry Initiative. The organization, which was launched in January, has been established as a working group under the MAP/Technical and Office Protocol (TOP) Steering Committee.

The MAP Process Industry Initiative boasts a mix of users and vendors. Factory equipment vendor members include 3M Corp., Mead Corp., The Foxboro Co., Honeywell, Inc., Bailey Controls Co. and Fisher Controls International, Inc. The group's initial meeting also was attended by representatives from the Computer and Automated

Continued on **page 17**

National MAP/TOP structure



SOURCE: BOEING COMPUTER SERVICES, INC., SEATTLE

FACTORY FACTS

BOB WALLACE

Carrier-band nets provide subnetworking solutions

Carrier-band networks may be the answer to factory networkers' subnetworking needs. Although a carrier-band specification has not yet been nailed down, one factory forecaster said several thousand systems will be shipped by 1990.

It is premature to predict the future of an as yet unspecified species. There is little doubt that carrier-band networks will serve to augment broadband, backbone Manufacturing Automation Protocol (MAP) networks in discrete and process manufacturers' facilities.

Carrier-band nets are easy to create and easy to dismantle, which, unlike their coaxial cable-based parents, do not support multiple channels. These single-channel, token-passing ring systems are being designed to support all communications within a single manufacturing area or cell. A manufacturing cell, for example, might support a half-dozen paint or welding robots on an automobile assembly line. Since 80% of a manufacturing cell's communications are done within the cell, a healthy market for carrier-band networks seems assured.

Mike Bukowski, project engineer with the MAP Development Team and a member of General Motors' Advanced Engineering Staff, said MAP Version 2.2, due out early this summer, will specify carrier-band as an alternate physical medium to broadband. The current version of MAP, Version 2.1, only mentions broadband coaxial cable for the physical layer of the specification. "Carrier-band is simply an alternative way of signaling that is envisioned as being less expensive," he said.

The lack of a carrier-band specification has not slowed the efforts of MAP vendors such as Concord Data Systems, Inc., Industrial Networking, Inc., Allen-Bradley Co., Motorola, Inc. and Computrol — a division of Kidde Automated Systems, Inc., which already offer carrier-band systems.

The most attractive aspect of these subnetworks is their price. Many per-connection prices for backbone MAP nets have been bandied about over the past year. It is generally acknowledged that since these mininets can use less expensive equipment and are easier to create, they will cost less than their faster counterparts.

Another positive feature of these nets is their flexibility. "Carrier-band networks can be put up and taken down quickly," Bukowski explained. "They are networks that your maintenance people would be able to modify and change. Carrier-band is designed so you could have your plant electrician take a week-long course and learn how to design and install these subnetworks."

Although carrier-band nets may eventually provide a solution for local factory communications, the networking scheme has some modest limitations. Bukowski explained that a carrier-band network can support a maximum of roughly 30 devices and is limited to one kilometer in size.

One of the keys to the development and proliferation of carrier-band networks will be the development of the internetwork router market. These devices will be used to tie a 5M bit/sec carrier-band network to a 10M bit/sec backbone network.

▶ FACTORY FLOOR

Ford faces MAP tool delays

BY BOB WALLACE
Senior Writer

Users looking to purchase products in the Manufacturing Automation Protocol (MAP) marketplace will encounter an elementary economics problem. There is a river of demand, but only a trickle of supply.

Although the mighty MAP movement is a user revolution, vendors still control much of the show. A total of 21 different vendors participated in the MAP/Technical and Office Protocol (TOP) demonstration at the Autofact '85 factory automation show in Detroit last November. The vast majority of these vendors placed prototype products in MAP/TOP network showcases. Few of these vendors have announced commercially available models of the prototype products that debuted at Autofact.

Ford Motor Co., the nation's second largest auto maker, has discovered problems with purchasing MAP products that other users have yet to encounter. Jim Conossen, manufacturing systems and operations research manager for Ford, claimed the tendency of many vendors to differentiate their

Continued on **page 17**

▶ MANUFACTURING

Kaiser updates Erie plant in three-phase MAP move

Pennsylvania-based aluminum corporation sheds World War II skin, implements broadband, coaxial cable-based network.

BY PAUL KORZENIOWSKI
Senior Writer

ERIE, Pa. — When the Kaiser Aluminium and Chemical Corp. plant was built here, how the Allies were faring in Europe was a principal topic of conversation. The plant, which is used for forging aluminum wheel covers, supplied products that the U.S. needed during World War II. At that time, manufacturing networks and computer-integrated manufacturing were concepts as farfetched as a trip to the moon.

Although much has changed since the shop was built, little has been done to the plant. In 1984, Kaiser decided it was time to completely overhaul the facility, which employs approximately 400 people. In addition to installing some much-needed manufacturing equipment and a new telephone system, the company decided it was time for a communications network.

Selecting a network

William Geibel, then chief electrical engineer at the plant, was charged with selecting a network that could accommodate the plant's immediate communications needs and yet be flexible enough to incorporate future developments.

Geibel and a group of other workers examined a number of alternatives, including fiber optics, hard wire, factory broadband, Ethernet, twisted pair as well as General Motors Corp.'s emerging Manufacturing Automation Protocol (MAP).

MAP's star had just begun to shine and its glimmer caught Geibel's eye. "MAP wasn't well-defined then, but it promised us the most flexible alternative," he said.

In 1984, MAP was more theory than reality, a situation that caused many potential users to shy away from implementing MAP networks.

Despite all of the uncertainty, Kaiser chose to become a part of a lonely group of MAP pioneers. "A few people in the U.S. MAP users group offered some suggestions during our installation, but we had to rely primarily on ourselves," he said.

> *"In 1984, MAP was more theory than reality, a situation that caused many potential users to shy away from implementing MAP networks. Despite the uncertainty, Kaiser chose to become a part of a lonely group of MAP pioneers. 'A few people in the U.S. MAP users group offered some suggestions during our installation, but we had to rely primarily on ourselves,' Geibel said."*

Before Kaiser could install the network, the company had to choose a vendor, and MAP vendors were as scarce as users. The contestants were 3M Corp./Interactive Systems and Concord Data Systems, Inc.

Geibel went with Concord Data's wiring and Token/Net Interface Modules (TIM), which connect devices to the network. "Concord's TIMs enabled us to attach either RS-232 or RS-449 connections to our network," he remarked.

Kaiser's network, which cost $160,000, was installed in three phases. Phase 1 involved connecting the factory's administrative offices to the network.

In the second phase, the north side of the factory was wired to the network. Phase 3 did the same for the south side. Geibel claimed that his group met all of its deadlines and the network installation was completed three months after its purchase.

Installing a MAP network presents a gamble, since the seven-layer network model is not fully evolved. There is a possibility that today's MAP equipment may not be compatible with tomorrow's equipment.

Thus far, Kaiser has not experienced any compatibility problems, even though its network has been upgraded a few times.

Aim for full frequency sweep

"Our problems have been very minor and were our own fault rather than the vendor's," Geibel noted. "Whenever one upgrades a network, one should make sure that a full frequency sweep is completed."

One reason for Kaiser's smooth implementation is that only one computer system, a Data General Corp. MVS10000 superminicomputer, runs on the network. Other network devices include a modular processor controller, load and temperature controller and an energy management system.

Since the initial installation, the company has upgraded its network with a network management package and a Token Scope Network Analyzer.

"The network management package enables us to monitor network operation and see what TIMs are turned on or off," he explained. "If one TIM is overloaded, the software enables us to make a change."

Geibel thinks the network has proven to be beneficial. "We are able to see the plant as a complete entity and monitor how one area is affecting a second," he said. "We are able to collect data and compare two nodes and determine if we should make any type of design change. Also, a user with one terminal can access any plant operation."

Because of the network's success, other enhancements are planned. "We may add more computers and peripheral items, such as our video security system, to the network," he added.

Geibel's pioneering experiences may prove helpful to Kaiser, which, like many large manufacturers, is attempting to upgrade its manufacturing facilities in the face of growing international competition.

Geibel is now the staff electrical engineer in Kaiser's automated systems group. He has moved to the company's Oakland, Calif., headquarters, where he acts as advisor to other Kaiser plants interested in installing a MAP network.

INCIDENTALS

Eastman-Kodak Co. is establishing a Manufacturing Automation Protocol (MAP) pilot test, which will examine the protocol's file transfer and messaging formats. The project, located at the company's Rochester, N.Y., headquarters, will connect three buildings in the company's office complex with a MAP Version 2.1 network operating at 10M bit/sec.

Vendors supplying equipment for this undertaking include IBM, Digital Equipment Corp. and Industrial Networking, Inc. Equipment for the pilot test was also provided by Videk, a division of Eastman Kodak Co.

▼

The next U.S. MAP/TOP users group meeting will be held in the Westin Hotel in Seattle on May 14 and 15. For information on the meeting, contact the Society of Manufacturing Engineers at (313) 271-1500.

▼

Ship Star Associates, Inc., Newark, Del., is holding a one-day seminar on Mini-MAP on April 11 in Bal Harbour, Fla. For information on the offering, contact Ship Star at (302) 738-7782.

▼

The Yankee Group, Boston, has released two research reports that examine the role of graphics in the factory. The two reports, entitled "Graphics to Change the Rules in Manufacturing" and "Graphics on the Shop Floor," are available immediately.

For additional information, contact The Yankee Group at (617) 542-0100.

White paper from **page 15**

Systems Association/Society of Manufacturing Engineers, the Ontario Center for Advanced Manufacturing and the Instrument Society of America (ISA).

Process manufacturers make up a large portion of the country's overall manufacturing industry. But those companies feel their sometimes unique factory networking needs have not yet been addressed.

Process vs. discrete production

Process manufacturing differs markedly from so-called discrete production. While discrete manufacturing involves building a finished product from stand-alone raw materials, process manufacturing is the creation of goods from nondistinct components such as chemicals, plastics and pharmaceutical elements.

Process industries include fuel-refining, ceramics and glass, petrochemicals, pharmaceuticals and plastics. Automated controls, gauges and other types of measurement equipment are mainstays on process manufacturing lines.

Much of MAP's focus to date has been on discrete manufacturers. But their process counterparts believe an understanding of MAP will eventually allow individual process manufacturers to decrease their reliance on only one or two factory equipment suppliers.

Bill Veeneman, chairman of the process industry subgroup and a member of Proctor & Gamble's management systems group, said the goal of the white paper project is to help users understand where the process industry is in regard to MAP. Veeneman said the report, which is not completed yet, will be broken into three sections.

The first section will examine MAP and TOP and their relationship to existing and proposed communications standards. The second portion of the report will compare and contrast the process and discrete manufacturing industries. The final section will explain how networks are used in the process industry. The paper is expected to be made public at the U.S. MAP/TOP users group meeting in May in Anaheim, Calif.

Fred Meier, an ISA staff member and one of the white paper's six authors, said process industry facilities are single-vendor plants.

"What's developing is [that] distributed processing systems are now available from a single vendor," he explained. "One vendor sells all the equipment necessary to control a certain process."

Veeneman agreed, but added, "What we are finding is most people don't see these facilities being single-vendor shops in the long term."

Veeneman is optimistic that MAP will allow single- and dual-vendor process facilities to become true, multivendor factories. "If MAP technology achieves its promise — and I certainly believe it will — network planners will be able to carve up their facility into smaller portions."

No compatibility problems

Once a common protocol is established, individual factory planners will be able to mix Vendor A's control room equipment with Vendor B's automated controls and gauges and Vendor C's signaling equipment. And they will do this without worrying about equipment compatibility problems.

Factory communications users in both the process and discrete manufacturing industries voice many similar concerns regarding MAP. Veeneman said the group is seeking answers to technical questions, including how MAP conforms to other standards and how MAP products will operate together. The group also seeks to learn about MAP network performance characteristics.

Network speed, reliability, availability, security and redundancy are pertinent issues the white paper will tackle.

As process manufacturing lines often handle combustible elements or dangerous chemicals, the process industry has a keen interest in assuring safety protection for personnel, minimizing process line interruptions and facilitating network restart and recovery when necessary.

PRODUCTS & SERVICES

Bevy of factory products debuts

Maxitron Corp. is expected to announce tomorrow a variety of products designed for use in factory automation applications.

The **Data PC,** equipped with the company's MultiScan operating system, has been enhanced to provide a real-time operating system and a background virtual-time operating system. MultiScan allows the company's Data PC to perform as a computer and controller combination in a single hardware module.

Oasis, Maxitron's Open Architecture Systems for Interconnect Services hardware and software product line, permits the Data PC to communicate with any number of programmable devices. The product line consists of coprocessor data communications modules. Each coprocessor is connected by the company's messaging system, which provides a multiprocessor network on the Data PC's backplane. Messages can be in Manufacturing Automation Protocol's (MAP) Manufacturing Messaging Format Standard format or in Maxitron standard format.

The **MAP-001** MAP network communications module eliminates the requirement for gateways to communicate with a MAP backbone network. The unit provides hardware and software modularity, ease of interfacing user application software and upward compatibility to subsequent MAP specification revisions. The MAP-001 supports the International Standards Organization's Open Systems Interconnect model.

The **Data PC DPC 67-20** computer/controller is a gate-arrayed version of the company's DPC 87-00. It has 64K bytes of memory and uses Maxitron's MultiScan operating system.

The **MSM-256 Mass Memory Storage Module** supports 256K bytes of battery backed random access memory. The device allows users to store data tables, production statistics and documentation information locally to the Data PC.

The **T 1607** is a portable workstation that is said to be fully IBM-compatible and features an 8-MHz 8088-2 CPU for increased processing speeds. The unit includes a 9-in. color monitor and a 10M-byte Winchester hard drive.

The **AC 107 Automation Computer** with the MultiScan operating system offers multiple CPU coprocessors, Oasis communications coprocessors, MAP network communications and multiple programming languages.

The Data PC with the MultiScan operating system costs between $3,595 and $10,995. The Oasis coprocessor costs $1,950. The MAP-001 module costs $2,250. The DPC 67-20 costs $3,595. The MSM-256 memory storage module costs $2,450. The T 1607 workstation costs between $6,000 and $6,500. The AC 107 Automation Computer costs between $24,000 and $26,000. All products will be available in June.

Maxitron Corp., 21 Tamal Vista Blvd., Corte Madera, Calif. 94925.

Ford from **page 15**

communications products is spilling over into the slowly emerging MAP product marketplace.

"This is acting as a roadblock to achieving fully integrated systems in the factory floor environment," Conossen declared. Ford already has one MAP Version 2.1 pilot project under way and has planned a second.

Bob Yee, principal computer operations engineer of technical and industry control systems for Ford, said he had been "surprised, or at least enlightened, as to actual vendor delivery schedules. When vendors say they have been working with the Autofact demo, that's one thing. But when I say I'm willing to cut a purchase order if you can ship your MAP product, it puts the nature of the conversation in a totally different light."

Yee said Ford has sent letters that explain Ford's intent to buy MAP-compatible systems in the future to most of its major suppliers of computers and manufacturing systems equipment. The vendors might not have products to respond with, but that hasn't slowed their marketing blitzkriegs.

A range of MAP-related issues

Yee commented on a wide range of MAP product-related issues:

- *Pricing and availability.* Yee said acquiring MAP products is not the same as ordering off-the-shelf catalog items. "MAP products probably haven't been priced yet. The vendor has to go through a lot of caucusing to determine what price they should charge because it isn't in their catalog and it's a custom product."
- *Product support.* "We have had to make agreements with vendors as to how much support they would provide. Not everybody within a given vendor company even understands what the product is."

> *"The vendors might not have products, but that hasn't slowed their marketing blitzkriegs."*

- *Delivery.* "We have found that MAP capabilities are not implemented across the board in vendors' entire product lines. MAP may not be available for Vendor A, Product Model X. It may only be available for Model Y." Yee warned that vendors claiming to support MAP may not be able to provide users with MAP capabilities in more than one product in their product lines.

Yee and company have expended an enormous amount of effort in creating, clarifying and maintaining working relationships with MAP product vendors. He said his experiences have served as an important learning experience. The data garnered from the vendor liaisons will be shared with other divisions within Ford.

"We have raised the level of awareness of MAP within the company, within the systems division and within the manufacturing engineering community as well," Yee claimed.

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COMMUNICATIONS MANAGER

> “A 10-year research study compiled in 1983 stated: “People don’t get sick from germs or risk factors like smoking, high blood pressure or high cholesterol; what’s killing them is the fact that we have been hit with 300 years of civilization in a few decades. Future shock is real; people begin to feel as if they’re losing control of their lives and their society, and they respond by literally getting sick.”
>
> From *First Time Manager*
> McMillan Publishing Co., New York, 1985

▶ HIRING

Resume heroes: paper tigers

Bogus applicants make big claims about “technologies-of-the-moment” experience

BY MARGIE SEMILOF
Senior Writer

Communications managers: Beware of resumes stuffed with buzzwords.

According to many managers, resume writers know there are so-called technologies-of-the-moment in high demand within the communications industry. So applicants often sprinkle their resumes with trendy communications terminology, even though their exposure to those key technologies may be limited.

But some managers say job candidates can forget trying to dazzle prospective employers with resume buzzwords like LAN, T-1 carrier and SNA/SDLC. Vincent Spagnolo, manager of technical services and communications at the Chestnut Hill, Mass.-based General Cinemas Corp., said the use of buzzwords is only an annoyance that masks the candidate’s true abilities.

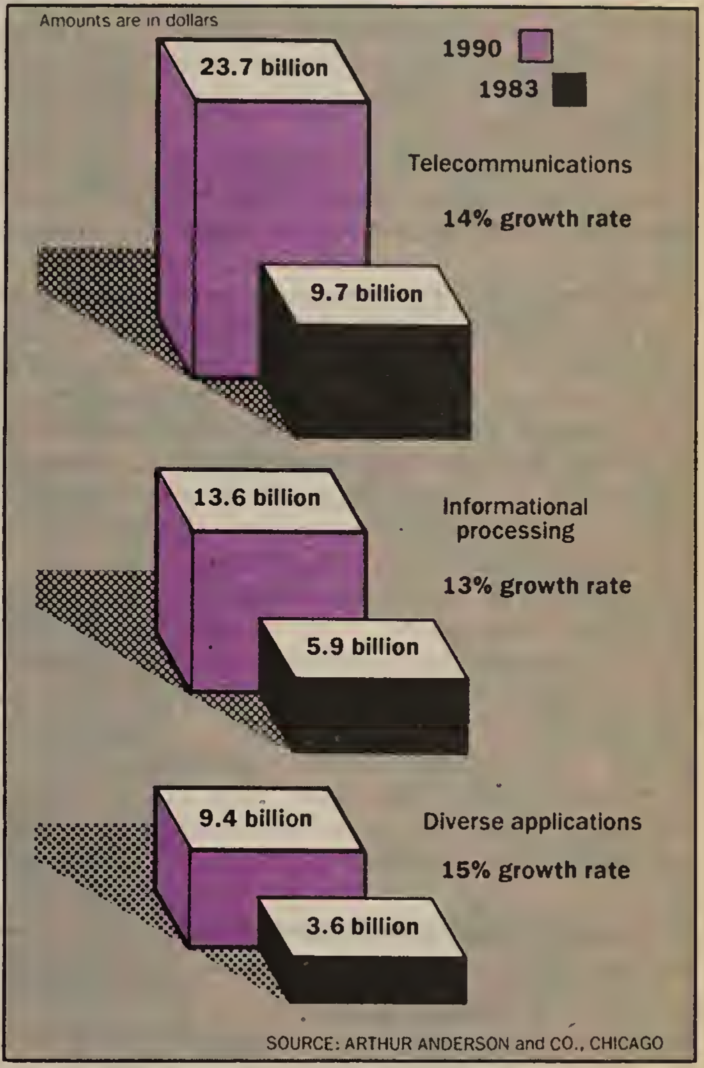
“The candidate does not have to go into great detail,” he said. “Just tell me a little about what job you’ve done. I don’t care about buzzwords.”

Jay Jacobson, president of the New York-based Personnel Resources International Corp., advised communications managers to insist that prospective employees be as specific as possible by identifying the precise equipment they have used in past jobs.

“What I tell job candidates is to be clear. Everyone receiving your resume is in communications,” Jacobson said. “Telling a manager that you coordinate communications is telling him nothing. Include the type of switch you worked

Continued on **page 20**

Projected electronic products growth rate



SOURCE: ARTHUR ANDERSON and CO., CHICAGO

GUIDELINES

BY MARGIE SEMILOF

Telecom high school

Unlike students of the famed New York High School for the Performing Arts, students of the city’s High School for Telecommunications are not Broadway-bound. But at least they’ll have jobs.

The high school isn’t boot camp for the nerd’s revenge. In fact, it’s attracting a wide variety of students from Brooklyn, N.Y.’s Bay Ridge neighborhood with a general interest in computer science and technology. Enrollment to date is 50% male, 50% female, and has a sweeping cross section of grade point averages.

The curriculum is designed to expose students to communications by infusing every academic discipline with technology. A traditional New York State Regents education is mandatory and students choose from a typical high school menu of extracurricular activities.

Principal Gloria Racovik says that the term communications is used broadly, so the school’s graduates will not necessarily be studying techniques in multiplexing. However, they will have the option of studying the divestiture of AT&T in their senior year. Racovik adds that most of the students who attend new student orientation have only a vague understanding of communications. Most of their experience has been with computers and a few have dabbled with video technology.

The telecom high school opened last September. It is in a 73-year-old building that once housed the now defunct Bay Ridge all-girls’ high school. The school’s communications technology bent was the brainchild of local councilman, former teacher and technology buff Sal Alvernese. Alvernese powwowed about the curriculum in sessions that included a state education task force, the local board of education and residents of the Bay Ridge community.

The school’s founding committee took about a year to find qualified instructors. They wound up with a lot of computer and video mavens, which Racovik said is fine because, “We never intended this to be vocational education. It is important to train students who are literate in all subjects as well as critical thinkers.”

All students will be hit with a heavy dose of computer lab training along with some cable and satellite technology applications courses. A satellite dish is scheduled to be in place on the school’s roof this month, and a video studio is scheduled to be installed by this summer. A technology center has been set up to help parents understand what their kids are studying.

So managers can take heart, knowing that some jobs in their overworked communications departments will soon be filled. If they can just hang on for a few more years.

▶ MILITARY

Air Force integrates managers

BY PAUL KORZENIOWSKI
Senior Writer

SAN ANTONIO, Texas — To many people, integration is a communications-related term. But the U.S. Air Force has applied the concept of integration to management.

The Electronic Security Command (ESC), a branch, or command of the Air Force, has revamped its data processing department and melded previously autonomous areas. The reorganization was set in motion two years ago when the Air Force decreed that its commands combine data communications and data processing functions.

Colonel Cecil E. Martin, the merger’s engineer, noted “The Air Force wanted to examine emerging technologies and determine how data processing and data communications departments could best perform their particular functions.”

Before the fusion, ESC projects,

Continued on **page 21**

▶ NETWORK PLANNING

Analyze first, then buy

Despite the pressures of time, it pays to plan carefully.

BY MARGIE SEMILOF
Senior Writer

Communications analysts suggest that users conduct an extensive strategic analysis of their company before purchasing new networking products.

But communications managers claim that the time taken to undergo such a project is a luxury they can ill afford.

Most end users, excluding perhaps the Fortune 500, give little conscious effort to long-term strategic planning for information management products and services. Analysts suggest that users avoid looking at technology in pieces and learn to approach each purchase as an integration of multiple technology that will save the customer money in other areas.

According to Ed Diamond, a project manager with the Eastern Management Group, a Parsippany, N.J.-based consulting firm, users sometimes find that they don't need technology to solve a particular application problem.

If those customers had conducted an analysis of their situation, they might have saved some money, Diamond said.

"The time you take to learn how your company operates can save millions," he added. "It may also enhance how technology will fit into a company plan. This must take place before the user writes the request for a proposal."

Unable to plan

But many managers say that they are forced to buy hardware as needed and are unable to plan for technology due to the special constraints of their businesses.

Richard Burdi, manager of communications services for the Lake Success, N.Y.-based Eastern States Bankcard Association, said that his non-profit company is driven by the needs of its clients.

Like many users, Burdi's goal is to simply do the same job for less money.

"Before we replaced our modems, we did sit down to figure out what we wanted to accomplish," he said. "But this is because we had leased those modems for years."

"We do not usually have time to do exhaustive research. We needed a product that was more reliable and less costly," he added. "We are a non-profit data-processing services firm and what we do is dictated by our bank-owners. We look at technology and how we will position ourselves to take advantage of those products."

Henry Davis, manager of data communications for Revlon, Inc.'s Edison, N.J., offices, said it is surprising how many communications managers do not have even a two-to-five year plan when they go to write a request for proposal (RFP).

"You must tailor even your most immediate needs around a long-term goal," he said.

Diamond said that one of the keys to making long-term planning commitments was to gain the support of upper management.

"Business operations people often don't know that communications is more than a dial tone or a personal computer," he said.

Before a user begins to write an RFP, Diamond suggested that he begin a building block plan of asking other managers in a company what future applications their employees may need. He also suggested introducing technology in small doses whenever possible and checking the results of those installments.

Diamond said that most RFPs are written in the same format: what the vendor will do for the user, how long the vendor will perform the task and what the cost is.

"The real question is what do I need, how do I do it, when should I do it and who needs it ?" he said. "Also, it is important to consider whether the product will gain end-user support."

"Before you write that RFP, make sure you know what it is that you are trying to write," he added.

"Don't buy a PBX from a dial tone perspective. If you use an integrated approach, then the technology may complement an area outside of the typical function of that product."

PEOPLE

Douglas Tillson was promoted to vice-president of manufacturing operations at Tecmar, Inc., Solon, Ohio. Tillson assumes responsibility for manufacturing, manufacturing engineering, purchasing and documentation. He served previously as director of manufacturing and acting vice-president. Tecmar also announced that Gardner Morris was appointed vice-president of administration.

Charles Askanas was appointed president and chief operating officer of Lee Data Corp. of Minneapolis.

Askanas was formerly chief executive officer and president of the company. He was also elected a member of the company's board of directors.

John L. Nelson was named president and appointed to the board of directors of Tampa, Fla.-based Megacom, Inc. Nelson joined Megacom last year as executive vice-president responsible for marketing and sales.

The Data Processing Management Association has made public the appointment of **John Cargill** as director of education.

Michael Miller was appointed vice-president of engineering at Verilink Corp.

Resume from **page 19**

on and describe your specific function."

Jacobson advised managers to adopt a structured telephone interviewing process if they find an unclear passage on a resume.

He said a key thing managers should look for when sifting through candidates' resumes is gaps in chronological employment history. That requires some reading between the lines.

For example, a candidate working in a particular position from 1982-1983 could have held that job for one month or almost two years. Managers also should be on the lookout for a candidate that stayed in a job for a long period of time.

"The manager must tease out what the applicant's true responsibilities were at his former job," he added. "During the interview, you can have the individual explain each position."

Buzzwords are just one of the traps managers should be aware of while reading the resumes of job applicants. Resume misrepresentation is another. Misrepresentation of background information — such as exaggerated salaries, experience or education — is as common in the communications field as it is in any other industry.

However, because the demand for qualified voice and data personnel is high, communications managers may not take the time to check references or employment history carefully. Therefore, applicants may find it easy to slip in fictitious information.

General Cinemas' Spagnolo said he has found few resume cheats in his 25-year communications experience. He also said that the misrepresentation he has seen was probably the work of headhunters or employment agencies.

"Headhunters just want to sell a body," he said. "The guy that sits home and writes his own resume may juice up the salary a little, but that is about it."

Communications industry job recruiters say managers can save a lot of time and aggravation by making a checklist of absolute requirements before reading resumes.

Norman Oppenheim, president of Fortune Communications Group of Nashua, N.H., a communications placement firm, said learning how to make a trade-off may be one of the most difficult lessons for managers searching for new staffers. He cautioned managers that there may never be an applicant whose skills completely meet the needs of the employer.

"A manager may be better off hiring a less-seasoned individual whose personality fits into a department better than a less-congenial candidate with more experience," he said.

Oppenheim says the manager who takes six months to find the right candidate could have spent the same amount of time bringing another applicant up to speed.

> *"Misrepresentation of background information is as common in the communications field as it is in any other industry. However, because the demand for qualified voice and data personnel is high, communications managers may not take the time to check references or employment history carefully."*

ESC fom **page 19**

such as the installation of a minicomputer, were broken down into specific groups according to what part of the installation they performed. For example, DP personnel loaded system software, and data communications personnel installed telephone lines for each terminal.

Strict demarcations made sense when functions could be broken down into specific groups. But as lines between disciplines became fuzzy, problems emerged.

A principal problem was unnecessary delays. For example, DP personnel would occasionally have to wait a month before the communications workers could install the telephone lines needed for a new computer.

Duplication was also a problem. “There were people in various areas who all worked with one type of technology,” Martin said. “A lot of work could have been avoided if one person supplied that technology to all areas.”

These problems, coupled with the Air Force decree, convinced Martin that a plan to structure the data processing department was needed. Rather than just consolidate the data processing and communications departments, the colonel decided to take a close look at the entire DP organization.

“Soon, distinctions between various DP professionals will disappear and information system workers will have to be familiar with a variety of technologies,” Martin said. “The ESC wanted to prepare for that change.”

Last July, the colonel assigned a task force of four people to determine how the DP department should be structured. The committee, dubbed the Gang of Four, interviewed ESC workers for a month.

From those interviews, the group recommended that the nine DP groups be divided into six new organizations. The previously separated hardware, software and communications personnel were part of each of the six organizations.

“We wanted each group to be responsible for a project from start to finish,” Martin noted.

“We no longer wanted one area responsible for only a specific piece of the puzzle.”

A second committee was assigned to implement the plan. “I wanted to involve as many people as I could in the reorganization process,” Martin said.

As the reorganization took place last fall, the Gang of Four and the implementation team came to play important roles in the new departments.

“We didn't realize it at the time, but in many cases committee members were writing their own job descriptions,” noted Dr. Alan Roecks, a Gang of Four member who is now head of the ESC's office of technology and training.

Since the merger last January, the DP department has increased its overall efficiency. Martin said that the installation of a computer system used to take between three and six months. That time frame has been cut to one month.

The colonel claimed that the reduced installation time will help the ESC implement 20 computer systems this year.

“Without the reorganization, we wouldn't have been able to install that many systems in one year,” he said.

Combining departments can be tricky, because egos are involved and groups typically become embroiled in power struggles. A likely struggle would have pitted data communications against DP.

To some extent, the ESC avoided this problem.

“I took direct responsibility for both of those departments,” Martin said. “I didn't want a manager in charge of someone who was his peer the previous week.”

> *“A likely struggle would have pitted data communications against DP.”*

But there have been a few problems because some workers resented the plan.

“For the DP professionals, the change was not significant,” Martin said. “In fact, the status of some workers may have been elevated a bit. Problems came from the old-line communications workers.”

Rather than cooperating, a few old liners decided to retire or work somewhere else.

“Whenever one implements something like we did, there are bound to be a few problems,” Martin said. “However, our problems were not significant.”

Martin credited the experiences of other Air Force commands with the ESC's smooth transition.

“A few other commands had gone through similiar reorganizations,” the colonel concluded.

“We were able to take their experiences and apply them to our situation.” ☒

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MARKETS

JEFFERY ROTHFEDER

Corporate Broadcasting?

What do American Can Co., General Motors Corp., Merrill Lynch & Co., J C Penney Co., Inc., Ford Motor Co. and Digital Equipment Corp. have in common? They are among the first firms to embrace one of the latest applications to emerge in satellite communications: encrypted, secure video and data networks with one central uplink, or transmitting site, and multiple downlinks, or receiving locations.

Looking at it skeptically, it's difficult to see corporate broadcasting, or point-to-multipoint video networking, as anything more than an attempt to carve a new market niche out of an industry that is in the doldrums. After all, even private satellite network owners that sell network time to end users concede that their combined revenues hit a peak two years ago at something less than $100 million and have shrunk since. Nevertheless, this new segment of communications is worth investigating closely.

Scientific-Atlanta, Inc., a 35-year-old company that specializes in broadcast instrumentation and satellite communications, is turning its attention increasingly to video and data encryption methods. After becoming a leader in the encryption field, the Atlanta-based firm was struck a damaging blow when it lost out to M/A-Com, Inc. on a lucrative contract to provide the equipment to scramble the satellite signals of cable television entertainment channels.

Faced with both eroded prestige and revenue, Scientific-Atlanta attempted to use its expertise as leverage to snatch victory from defeat. It backed away from the entertainment industry and began a full-court effort to develop satellite equipment and applications for the virgin corporate broadcasting marketplace. The result was a lavish series of announcements last year proclaiming the release of the Echelon product line. These are devices for point-to-multipoint one-way video, audio and data satellite networks.

For $3,000 to $15,000 per site, Echelon supports high-quality video, audio and data transmission that is protected by Echelon's proprietary B-MAC encryption scheme. The encryption format is both easy to address and seemingly unbreakable.

What's more, the Echelon offering is unique in the marketplace. Other companies — notably Xerox Computer Services, Mountain View, Calif.-based Equatorial Communications Co.and Burlington, Mass.-based M/A-Com, Inc. — provide equipment and satellite time for secure data networks. However, these firms have shown no interest in tapping the corporate video marketplace. TRW, Inc., ITT Corp. and others have announced products for one-way video and data satellite communications, but are well behind Scientific-Atlanta in understanding and penetrating the market.

Finally, firms such as New York-based Private Satellite Network, Inc. and Electronic Data Systems Corp. in Dallas, a subsidiary of GM, are offering services similar to Scientific-Atlanta's and are also providing satellite time — something Scientific-Atlanta does not offer. But these companies, it turns out, are actually resellers of Scientific-Atlanta equipment.

Compared with the disappointing video

☞ Continued on **page 41**

Rothfeder is a free-lance writer based in New Jersey.

PRO:

College degrees don't have enough staying power, and on-the-job training just isn't enough. Communications professionals should be certified by an independent organization. The organization must provide a curriculum for continuing education and an examination procedure to measure the development of professionals. The "pro" argument:

Should voice/data

BY STEVEN J. KNIER
Special to Network World

The communications industry is growing every day, with thousands of new names being added to its payrolls each month. The information age has arrived, and the potential and opportunity for growth seem almost endless.

To accommodate this growth, the communications industry needs a vehicle with which to set-training standards for those entering the field and to provide career direction and advancement for those already in it. Although new technologies, such as integrated voice/data networks, fiber optics and integrated systems digital networks, create promise for the future, they also expose an immediate need for qualified technicians, system analysts and network managers.

How are communications departments going to stay ahead of the game when employee training or growth stops at the level of the company's best technician?

Individuals just entering the communications industry, equipped with a college or technical school education, face major obstacles to their growth. New entrants will have their on-the-job training from the same professionals who are seeking additional training on advanced technologies themselves.

Industry potential cannot be achieved and new technological advances cannot be implemented or pursued without additional trained communications professionals. Certification can provide that.

The need for trained personnel is actually twofold. As telecommunications and data communications move steadily toward integration, many professionals require additional education. And as they strive to maintain and expand existing systems, they may not be able to keep up with advances in the industry.

Industry certification is the alternative most likely to achieve results. This is not to suggest that certification in itself will guarantee professionalism or effective personnel, but rather, that preparation for certification will produce qualified, motivated and technologically advanced employees.

Certification begins with a curriculum, established by industry experts, that parallels the growth and direction of professions. Built on education, the certification curriculum establishes a hierarchy of educational programs and achievement requirements. Even though certification is a voluntary process, it must contain an examination procedure that measures the development of participants at each level.

Recognizing the diversified nature of experience levels, educational backgrounds and professional training of the individuals already involved or just entering the communications industry, certification must provide a placement vehicle for individuals to test into the program at specific levels of need and knowledge.

Who does certification benefit? Basically, it benefits everyone: employers, current employees, new employees, end users, vendors and the communications industry.

For the first time ever, employers will be able to track the professional development and technological exposure of new employees by reviewing their certification credentials. Standards will exist to measure the progression and growth of employees as they parallel the growth of the industry.

Employers can stop spending time and money on random, undirected education. In most cases, certification produces a new breed of manager or technician, one which is motivated

☞ Continued on **page 41**

Knier is president of The American Institute in Madison, N.J.

CON:

A college degree provides all the certification communications professionals will ever need. As can be seen from the experience of the airline industry and other professional groups, industry-specific independent certification is unnecessary and may do more harm than good.

The "con" argument:

TOM BARRETT

pros be certified?

BY JAMES J. COUNTRYMAN
Special to Network World

The demand for certification of professionals is often heard from people working within certain fields who, desiring respect or prestige, perceive certification as a means to achieve both almost overnight. This tried and true tactic has served some groups rather well in the past.

One group that has taken the certification route is the airline industry, which brought external regulation upon itself in the 1920s and 30s. The process set up the insiders as professionals and served to keep out newcomers, or at least make entry into the club more difficult.

Another example was former AT&T President Theodore Vail's classic strategy that called in the regulators on AT&T to protect it from competitors, which led to that uniquely American invention — the regulated public utility.

It appears that contemporary arguments for certification arise from these classic examples. Before divestiture, telecommunications professionals were buried in the bowels of their organizations. They felt a real need to enhance their prestige and their positions within the organization.

Today, divestiture has changed the setting in which telecommunications professionals work. Many now have stature within their organizations and are able to talk to vice-presidents and presidents. It seems that their need for respect and prestige has been fully met, which nullifies arguments for certification on that basis.

Moreover, as efforts to certify other groups reveal, a major problem with establishing certification is that incumbents want to be recertified without first being required to complete any additional training or to pass any kind of competitive examination. Continuing education requirements are equally unpopular.

Another argument is that certification would protect the public. A review of the current licensed professions indicates that this is not necessarily the case. Experience in reviewing the work of the board of regents, which licenses professions in the state of New York, reveals that there are long lead times between malpractice and disciplinary action.

Further, because telecommunications professionals rarely make decisions with life-threatening consequences, there doesn't seem to be an urgent need to protect the public by certifying them. Competition and performance in the marketplace will drive out the ill-prepared more quickly than any regulatory agency could.

A third pro-certification argument is that there should be some standardization of preparation for practice. By setting standards, consumers could expect a certain threshold of expertise in licensed professionals. Although this is a laudable goal, it would be an extraordinary task considering the tremendous breadth of telecommunications. The field encompasses international politics, international standards, economics, regulatory issues, hardware, software, and business issues.

The idea that a certifying group could even minimally prepare professionals in all of these areas is ludicrous. Although people can gain a general view of the field and have some idea of its breadth and scope, one can only be really proficient in a few areas. And given the rapid march of the technology, any standards that one would pass today would be out of date six months from now.

In many ways, the field of telecommunications is where computer science was about 25 years ago. Bright people enter the field with all

☞ Continued on **page 41**

Countryman is vice-president for academic and student affairs at the State University of New York, College of Technology, Utica, N.Y.

COMMENT

STEVE MOORE

ISDN: conduit versus content

Ignore the cynics who sneer that ISDN enthusiasts are naive ninnies chasing a blue-sky acronym that will never mean more than "It still does nothing." They obviously haven't noted several recent developments that will hasten the coming of the day when integrated services digital networks are commonplace.

Item: A consortium of 30 influential U.S. companies (including Apple Computer, Inc., Bell Communications Research, Inc., General Electric Co. and United Technologies Corp.) is actively supporting development of a new integrated wiring scheme that will carry voice, data, video — *and electricity* — throughout commercial and residential buildings.

Item: The Federal Communications Commission recently voted unanimously to completely deregulate the installation and maintenance of commercial and residential telephone wiring.

Item: ISDN customer premises interface units are increasingly perceived as compact local-area networks. As such, they will make it easy for users of the public switched telephone network to deploy and interconnect telephones, computers, appliances, environmental control systems and, eventually, digital televisions, which will then become just another type of terminal.

Item: The deregulatory juggernaut, which, despite the loyal opposition, shows few signs of slowing down at either the federal or state level, is about to overrun the last bastions of telecommunications monopoly, the local loop and the residential and small business customers. When that happens, each end user will determine how much bandwidth he wants. Even better, he will draw his own line between the services that are provided by the customer premises equipment he selects and those that are provided in the network by a wide variety of communications and information service companies, including common carriers, value-added networks and information service providers.

What does all this add up to? Just as the videocassette recorder is breaking the mini-monopolies of television stations and movie theaters, the ISDN promises to break the mini-monopolies of communications and information service providers that still seek to maintain a proprietary lock and prevent customers from mixing and matching different vendors' services (and the equipment through which they are supplied).

Ideally, anyone connected to the public switched network would be able to conduct the type of information search that is only available today to well-connected executives. Such a search would cover all information media, from radio and television through newspapers and magazines to videotex and on-line databases. The results would be communicated in digital form to the customer's premises, where they could be recorded on an appropriate mix of media, including computer disk, VCR, audio tape and hard copy.

The end user stands to benefit most froml all this, but only if two basic regulatory tenets essential to ISDN's success are preserved. First, no single entity should be allowed to control both the conduit for information and the information itself. Users would benefit most if common carriers

☞ Continued on **page 41**

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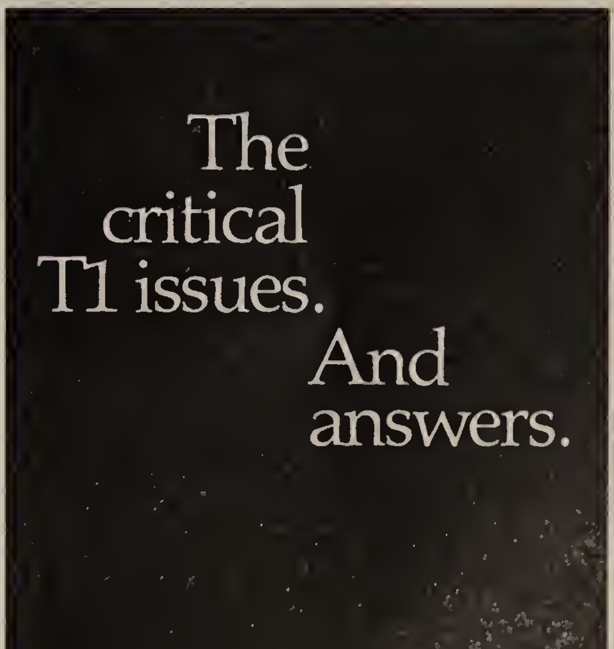

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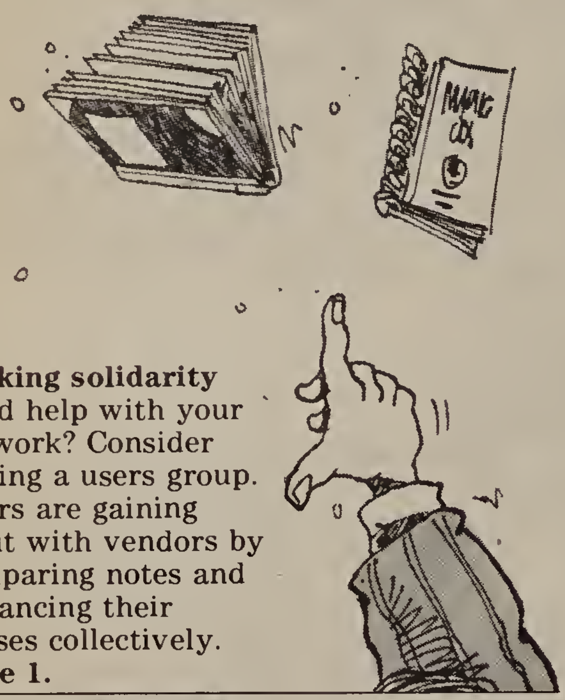
Features

April 7, 1986



Seeking solidarity
Need help with your network? Consider joining a users group. Users are gaining clout with vendors by comparing notes and advancing their causes collectively.
Page 1.

Global switch bridges London
The tribulations of British users in dealing with British Telecom provide a revealing counterpoint to the AT&T-dominated U.S. communications arena. Here's what happened when a scrappy Britisher bought a switch.
This page.

The glacier advances
Until recently, IBM's cumbersome host-oriented network architecture was clearly unsuited for multivendor networking. Other vendors surpassed the Blue Giant with flexible, open-network architectures. But IBM's latest countermove, Advanced Program-to-Program Communications, may signal a duel to the death in the networking arena.
Page 31.

Does might make right?
IBM is finally delivering on its promise to shake up its rigid, host-dominated product pecking order. As this review of network architectures shows, SNA is establishing a new peek-to-peek social order throughout the world of communications.
Page 35.

▶ THE BRITISH TELECOM SCENE

Global switch bridges London

An aggressive British user hunts up a switch and tackles British Telecom head on in the process.

BY NEILL EDWARDS
Special to Network World

LONDON — The new building was unfinished. Bus bars distributed power to its upper floors, but it still needed electrical and telephone cabling. The ground floor was raw concrete, awaiting insulation and elevated deck floors.

A team of engineers from Global Engineering Ltd., an energy consulting firm in London, was given just 16 weeks to select a new private branch exchange, lay out the five floors covering 69,000 square feet, organize the building modifications, provide services and distribution, equip the building and, finally, move in.

Selection

On July 27, 1984, the Global engineers embarked on their mission.

Global operates 18 offices around the world, and its London headquarters needed to be expanded because of the firm's growth in North Sea and international operations. This was the second time in the last four years that expansion had forced Global to move its offices, and the search was on for a new private branch exchange to provide voice and data services for the new building. The engineers' first task was to obtain up-to-date information about PBXs.

Edwards is communications manager for Global Engineering Ltd. in London.

Contacts were made concerning the following products:

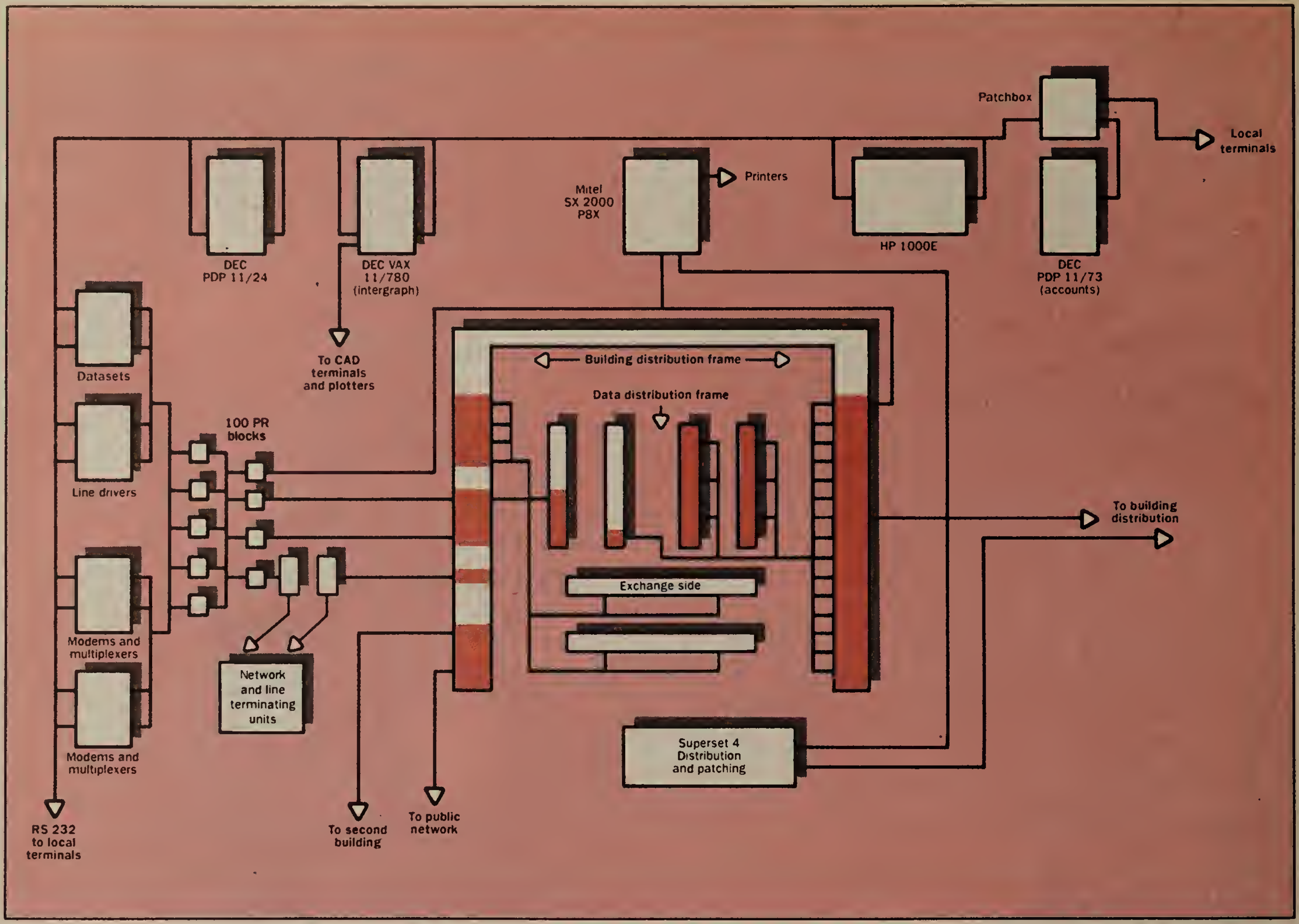
- Plessey Corp.'s IDX and Mitel Corp.'s SX-2000, both offered by British Telecom;
- Ericsson Information Systems, Inc.'s MD110;
- Ferranti PLC's GTD-1000 range;
- General Electric Corp.'s (UK) Reliance, SL1/SLX;
- Harris Corp.'s Model 1200;
- IBM's IBM 1750;
- International Computers Ltd.'s DNX2000, which is equivalent to the Mitel SX-2000;
- Mitel's SX-2000;
- Philips Telecommunications BV's EBX8000/TBX3000;
- Plessey Business Systems' IDX; and
- Telephone Rentals' TDX, which is equivalent to the Plessey IDX.

In July 1984, the headquarters in London had approximately 220 extensions with 25 trunk lines for voice to serve a staff of 250 plus several client offices that interfaced with the system. A dozen more lines, terminated in modems, served ports on three host computers: a Digital Equipment Corp. VAX, a DEC PDP and a Metier Systems Artemis, equivalent to Hewlett-Packard Co.'s HP1000.

The company was then using about 30 terminals, linked to the three host computers by RS-232 asynchronous connections. Voice communications included a provisional sizing of 350 to

☞ Continued on **page 28**

KEN CONDON



SOURCE: GLOBAL ENGINEERING LTD., LONDON, ENGLAND

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360 extensions with perhaps 32 trunk lines to allow for additional company growth.

When considering whether the new switch should be able to handle data or not, the crucial factor was cabling costs. Within the previous year, approximately $15,000 to $20,000 had been spent on three partial rewirings of the RS-232 network. Circuit-switched data over two-pair telephone cable offered a flexible and cost-effective alternative. The engineers, however, were willing to pay the price for the provision to connect a terminal to any nearby telephone socket.

Regulation was another consideration. In the UK, the British Approvals Board for Telecommunications must type-approve all switches — a lengthy, expensive process. In addition, the switches must comply with the Consultative Committee on International Telephony and Telegraphy standards. Bell Standards often are tighter than the relevant CCITT rules, but are not applied in the UK. That's why there is a scarcity of U.S.-manufactured equipment.

Accordingly, a specification must be prepared very simply because prime technical specifications are determined by legislators — not by clients. The regulatory problem for British users is that the freedom to operate and control the switches varies according to the type of switch. This situation causes headaches for users.

Four of the potential suppliers — Ferranti, Ericsson, Philips and IBM — were dropped for a variety of reasons. The Ferranti switch appeared to be too small. Subsequent information showed this not to be so, but by the time this information became known, a commitment had already been made. Ericsson was unable to meet the delivery requirements. The Phillips EVX 8000 was too large and too expensive, and the TVX 3000 was not yet type-approved. IBM was approached later than the other suppliers, and by that time, the engineers had decided upon an all-digital switch. That meant IBM's 1750 was out.

The remaining suppliers were asked to meet a nearly impossible time scale of supply, installation and commissioning, with cutover to traffic within 12 weeks. The schedule required the switch to be on site within six weeks from the time of inquiry. The pressure intensified. As the deadline drew closer, the selection criteria became more stringent. Harris and GE dropped out because of their inability to provide information on short notice. Harris had sent one glossy leaflet with no specifications, and GE sent several glossies, but again, with no specifications. This left only two switches: the Plessey IDX and the Mitel SX-2000, but three suppliers for each. Careful cost comparisons needed to be made.

The IDX was about 20% less expensive than the SX, but it lacked the tremendous flexibility of the SX. Mitel's Superset 7 console allowed modifications to the customer data base and provided a full range of commands and operations. It could also reassign telephone numbers, classes of services and restrictions, account coding and many of the other required operations. Similarly, Plessey appeared to have no real equivalent to the functionality of the Mitel operators' terminals. It could not provide direct interactive switching of data, operable from a terminal keyboard.

> *“The remaining suppliers were asked to meet a nearly impossible time scale of supply, installation and commissioning, with cutover to traffic within 12 weeks. The schedule required the switch to be on site within six weeks from the time of inquiry. As the deadline drew closer, the criteria became more stringent.”*

On Aug. 10, the decision was made to purchase the Mitel SX-2000 system because of its Superset 7 console. Now it came time to sort out the best of the three suppliers based on cost and value.

British Telecom, a telephone operating company as well as a vendor, had a number of advantages that tipped the scales in its direction. No matter where a switch is purchased in the UK, it has to be interconnected with the public switched telephone network. That means that British Telecom has to get into the act.

British Telecom representatives must come to the site and witness a number of tests to make sure that the system conforms to noise specifications. If the system passes British Telecom's tests, then it can be connected to the network.

Another point in British Telecom's favor was that it proposed to sell 73% of the cost of the block wiring on the upper floors of Global's new building. That purchase would allow Global to cable for data as often as it liked — within the limits of the British Approval Board for Telecommunications. The engineers specified to British Telecom that the block wiring should be split effectively into two groups and that each 20-pair distribution point should contain 10 pairs for voice and 10 pairs for data. Global was committed to achieving switched data communications while avoiding a repetition of its RS-232 cabling expenses.

British Telecom had a monopoly

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on wiring installation until 1984, when owners could purchase up to 75% of the cabling. Owners can actually purchase more than 75% — providing they don't intend to hook their systems into the public telephone network.

While the decision was still up in the air, one small breakthrough occurred. At the last meeting of the Mitel Users Association, the government's Office of Telecommunications, the UK's version of the Federal Communications Commission, established that any user may buy cards from the original manufacturer and instruct British Telecom to install and maintain them. This was a crack in British Telecom's armor. At one time, British Telecom had refused to maintain anything that it didn't supply. Because the system and the cards would now be type-approved on a general basis, British Telecom could no longer refuse.

After 11 days of hammering out the fine details of the offer, British Telecom and Global signed an agreement. Twenty-four days had elapsed since the first acknowledgment of the move.

The contract with British Telecom embodied several other requirements related to Global's wish to retain the prime telephone number for the new site. One of those special requests was that British Telecom wire in and modify four "data cabinets." As sole supplier of all services, British Telecom had to take complete responsibility for its installations.

Global's team members asserted that the massive government conglomerate did not intimidate them. When a problem arose, Global could say to British Telecom, "It's your problem. Fix it."

The engineering team discovered that it could wield quite a bit of authority itself by becoming unpredictable. It accomplished this by refusing to deal only with British Telecom's immediate local representatives and by telephoning their superiors at the slightest provocation.

As part of the contract, British Telecom arranged for two Global people to take a service adviser's course at Mitel in the operation and programming of the switch.

To keep British Telecom on its toes, Global's engineers threatened to publish the details of their latest problems in the national press. British Telecom responded quickly, and the delivery and installation of equipment was generally on time with a minimum of fuss.

The switch was delivered in two installments — the first cabinet on Aug. 29 and the second on Aug. 31. The Systems Test Certificates attached to the switches indicated that they had passed final tests the previous day and were crated and directly transported. This took place just 10 days after the contract was signed.

The cabling plan required some form of patching because there were only 80 data ports on the SX 2000, yet there were 670 data pairs terminating in the frame room. The engineering team asked for a data distribution frame setup that permitted users to patch individual terminals from anywhere in the building on an as-required basis, without the need to call a technician every time.

> *"The engineering team discovered that it could wield quite a bit of authority itself by becoming unpredictable. It accomplished this by refusing to deal only with British Telecom's immediate local representatives."*

Cabling commenced. The teams worked late, with many activities going on around them, including construction of the computer room walls and the installation of carpeting, lighting, air- conditioning, curtains, power and data cabling. Hardly an ideal environment in which to work. Six weeks later, the first section of computer deck flooring was installed, following a delay because of construction on the ground floor. When the PBX arrived, the cabinets were placed on partially completed deck flooring that had wedges keeping it stable.

The switch went live on Nov. 13 for the first time. Six days later, telephone lines were connected. On Nov. 22, the move was complete. Mission accomplished. ☐

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▶ EVALUATING THE PBX

Global Engineering's switch displayed a few kinks, after the fact

The Mitel Telecommunications SX-2000 ICS private branch exchange is fundamentally a docile switch, easily handling Global Engineering Ltd.'s requirements and accepting daily changes of the data base — such as name and number changes, account codes, classes of service and restriction — without complaint or failure.

There are just a few areas in need of improvement:

One reason the team of Global engineers chose the SX-2000 ICS was for the capabilities and aesthetics of the Superset 7 console. The size of the console, however, obscures the receptionist who uses it. If it had been designed as a pair of boxes, the computer portion would go under the desk like many of today's microcomputers, with a small screen unit sitting on the desk.

The low-contrast screen is amber on a grey background, which is difficult to read in a well-lit or sunny foyer — even when it is equipped with polarizing screens.

Design flaws

Two keys are poorly located on the keyboard: The "Quit" key is located too close to the "Tab." The "Phone Book" and "Call By Name" keys would serve right-handed operators better if they were located at the bottom right section of the keyboard instead of at the top right.

The engineers say they wish that the SX-2000's data-handling capabilities were as well-developed as the SX-2000 voice capabilities at this time, although they say they knew from the outset that its data handling potential would continue to be developed over a considerable period of time.

Another issue has to do with what ought to be developed. At the moment, communication is easy through the PBX from a terminal using a data set.

An operator can enter commands to connect the terminal to any of the host computers by name or number. The SX-2000 will advise if the name is typed incorrectly, or if all lines in the hunt group for that host are unavailable, and it will queue the terminal and update the user as to queue status.

> *"One reason the team of Global engineers chose the SX-2000 ICS was for the capabilities and aesthetics of the Superset 7 console."*

But there are times when the user wants to communicate with the switch to access its data base for specific information.

Five-tiered security

The switch designers deliberately instituted a five-tiered security system to prevent anyone from tampering with its customer data base or system software and causing a communications catastrophe.

Perhaps this is asking the switch to be a specialized computer, but Global engineers run into situations where it would be better to call up information from the switch's data base.

Another request is the capability to connect the VAX computer to the SX-2000 system via an Ethernet interface or a token-passing ring. Either arrangement would permit the connection of many terminals without the need for so many data sets or data cards.

Service is a plus. During the times of selection and ordering, as well as the period following installation, Global says it found Mitel to be helpful and cooperative, although the engineering firm is not a direct client of Mitel.

— *By Neill Edwards*

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▶ SNA COMMUNICATIONS

The glacier advances

BY JOHN DIX
Senior Editor

Although it is not the magic elixir many have billed it as, IBM's Advanced Program-to-Program Communications (APPC) facility has amassed overwhelming industry backing and promises fundamental changes in networks and networking.

Commitment to APPC will facilitate the creation of multivendor networks by requiring that each node be APPC-compatible. Adherence to APPC will eliminate the customer's need to tailor communications network software to accommodate different types of vendors, machines and resident software. The migration to this environment will be slow but, just as a glacier irreparably changes the landscape it leaves behind, APPC will reshape present network doctrines as it is implemented piece by piece.

At the lowest level, transport networks may have to evolve to meet new data flow requirements and longer, more frequent messages. Processor resource planning will have to be rethought as segments of hierarchical network architectures are flattened out and hosts are taken out of the communications loop between peer devices. The beginning of the end may be in sight for proprietary vendor networks like Digital Equipment Corp.'s Decnet.

APPC's inertia will spur the development of new generations of hardware and software, analysts concur. Those that do not fall in behind the de facto standard do so at their own peril. Eduardo Stecher, vice-president of marketing for Software Research Corp., a consulting company in Natick, Mass., that also sells information delivery products, says flatly: "Hardware vendors that don't offer APPC will be gone in five years."

Part of IBM's Systems Network Architecture, APPC is often referred to by its components, Logical Unit 6.2 (LU 6.2) and Physical Unit 2.1 (PU 2.1). It has been defined as an architecture, a high-level program interface, a network operating system and a protocol.

Robert Sundstrom, manager of communications systems architecture at IBM's Communications Products division in Research Triangle Park, N.C., describes APPC — which he says is synonymous with LU 6.2 — as a program interface and an operating system. As a high-level program interface, LU 6.2 provides a set of conversation verbs that a programmer can embed into a program when that application needs to communicate with another application, perhaps to access a remote data base.

To do this, Sundstrom explains, "the programmer would issue the LU 6.2 verb called 'allocate,' which says, 'I'd like to converse with this other program.' He would then issue a 'send' command. The program at the other side would be started up and, if it were a request for file access, would package the data and return it to the other end."

LU 6.2 translates these commands and destination data retrieved from a directory into messages that can flow through the network.

According to Sundstrom, "the user of that high-level programming interface doesn't have to be sensitive to the location of the destination or sensitive to networking in terms of efficiency, encoding or flow control. "That's taken care of by the LU."

LU 6.2 also can be viewed as a distributed operating system, Sundstrom said, because it gives access to and manages contention for resources. "A computing system's operating system allows the sharing of different resources like files and printers without requiring the user to be aware of other users. LU 6.2 provides that kind of capability in a network environment."

The need for APPC is generally attributable to a growing interest in distributed processing — the need for an application in one processor to access data in another processor — regardless of make or machine type. This ability is critical to some large centralized teleprocessing shops that want distribution to lessen the burden of supporting massive terminal populations, sometimes 50,000 or more. It also is critical for shops that want to gain importance within corporations across the board as the use of departmental processors and networked personal computers continues to proliferate.

For all of its benefits, APPC is not a panacea for networking systems with incompatible data structures, even within an IBM processor environment. "LU 6.2 allows you to communicate between machines," Sundstrom says, "but it does not address the file structures or any of the data stream questions. One of the strengths of LU 6.2 is that it can carry any data stream."

Data structure incompatibility is addressed at a layer above LU 6.2, the sixth, or presentation, layer of IBM's seven-layer SNA network architecture. "To be compatible, you have to be compatible at all the layers," Sundstrom said. "LU 6.2 takes you a long way, but, of course, it doesn't take you all the way in terms of the application or the data stream."

Today, IBM addresses this incompatibility on a machine-by-machine basis. It offers, for example, Distributed Data Management, a transaction service that defines a common format and language for communicating between systems.

It currently is provided only on the System/36 and System/38. Future machines may be

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JOHN KILROY

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built with a Distributed Data Management file structure, alleviating much of the conversion needed, Sundstrom indicates.

Although it is only part of the communications conundrum, APPC is a significant piece.

"LU 6.2 means I don't have to write the software communications interfaces if I have one office server in a DEC environment and another one in a Wang environment," explains Bruce Compton, manager of office systems and technology with General Electric Co.'s Information Systems. "I can use the LU 6.2 standard to pass files between those devices, and I don't have to worry about things like block checking and clock.

"That is not to say the files will be mutually intelligible," Compton continues. "You still have a problem at the applications layer, but at least I know the communications software piece has been taken care of."

The problem is that even within IBM, LU 6.2 is not broadly supported. "IBM really only has one area of the mainframe that takes advantage of LU 6.2, and that's CICS," notes Dale Kutnick, a consultant in Wayland, Mass. "There is no interface for IMS, TSO, DBII or JES."

LU 6.2 is implemented in different ways on different systems. As Kutnick notes, on IBM System 370 architecture processors, LU 6.2 is provided by CICS and uses Vtam as the access method.

On the System/36 and System/38, it is integrated into the operating system. On the Personal Computer, it is provided through a separate program called APPC/PC. Other devices, such as the 3820 page printer, the DisplayWriter and the Scanmaster facsimile machine, come with LU 6.2 bundled into either microcode or a dedicated application.

Implementation dictates whether LU 6.2 is supported in an open or closed manner, with the latter excluding customer programmability. CICS, the Series/1, the System/36 and System/38 support LU 6.2 with an open Application Programming Interface (API) to which customers can tailor their applications. Other implementations incorporate LU 6.2 as a closed API, permanently marrying the LU to a machine or application.

LU 6.2 can be implemented on different types of PUs within the SNA architecture. The PU, or node type, is determined by the device's network capabilities, Sundstrom says. Certain questions must be answered before a node can be assigned to a particular type. Can it do intermediate network routing? What kind of transmission format does it have? What kind of addressing does it do?

To acquire the full capabilities of APPC, however, LU 6.2 must run on a relatively new type of physical unit, PU 2.1. Coupled, LU 6.2 and PU 2.1 provide for peer-to-peer communications. This would enable, for example, two networked System/38s to communicate without having to go up through a host in the typical hierarchical fashion of SNA.

PU 2.1 improves on PU 2.0 — a general-purpose physical unit associated with the dumb peripherals SNA was initially designed to support — by enabling the end node to initiate communications sessions. This is particularly important when the node is intelligent, as with minicomputers and microcomputers.

"Without PU 2.1, we have to sit out here in the network and wait for the host to initiate the creation of a session," says Tim Wise, vice-president of Pathway Design, Inc., a Natick, Mass., company that makes SNA and Binary Synchronous Communications products for micros.

"With PU 2.1, Personal Computers can kick the host awake, go out and bind another device. If you only implement LU 6.2, then you're still going to have to wait for the host to issue the session creation."

Development of peer-to-peer communications within SNA, combined with the LU 6.2 network operating system, promises to change SNA networks irrevocably. Consultant Kutnick simply says: "The APPC concept will revolutionize networking."

Ultimately, networks may support nothing but APPC nodes that enable micros to talk to minis, which talk to mainframes as peers in a multivendor shop.

"The network manager is going to see a complete network of APPC nodes," predicts Stecher of Software Research. "That's very realistic," agrees Mike Nearman, manager of technical support and distributed processing at United Airlines, Inc.

General Electric and other large

▶ DEFINING SNA UNITS

The physical and the logical

IBM's Systems Network Architecture supports nodes that are identified as one of four types of physical units (PU). SNA also defines logical entities in relation to these PUs and dictates how logical units (LU) interact.

Advanced Program-to-Program Communications assumes the presence of LU 6.2 and PU 2.1, two relatively new unit types. Robert Sundstrom, manager of communications systems architecture with IBM's Communications Products division in Research Triangle Park, N.C., listed the various PU and LU types in a recent interview.

Physical units include the following:

- PU 2.0, a general-purpose end node associated with all SNA peripheral nodes such as 3274 display controllers, remote job entry (RJE) stations such as the 3770 and printers such as the 3820.

There used to be another node, called PU 1, but "there were never many products identified as that type, and that's not a type we're emphasizing now," Sundstrom said.

- PU 4 is a communications controller or front-end processor.
- PU 5 is a host processor.

The lower SNA layers supported are primarily determined by the node type, whether it has intermediate routing capacity and the types of addressing and formatting support it provides.

The LU type specifies the higher level protocols. If you split the seven layers of SNA into two groups — the higher level and the lower level — the higher level would be the LU and the lower transport level would be determined by the PUs, Sundstrom said.

There are multiple LU types:

- LU 0 is a product-specific unit type used for devices such as specialized store controllers. Each product-specific LU 0 is unique.
- LU 1 is used for printers and RJE stations.
- LU 2 is used for the 3270 line of display stations.
- LU 3 is for printers that use the 3270 data stream.
- LU 4 was a precursor to LU 6.2, designed for low entry cost for terminal-to-terminal communications and terminal-to-host communications.
- LU 6.0 and LU 6.1 are called intersystems communications and have been implemented in CICS, IBM's most popular teleprocessing monitor, and IBM's IMS data base management system.
- LU 6.2 represents a merger of the requirements of LU 4, LU 6.0, LU 6.1 and LU 0.

"What we're trying to achieve with LU 6.2 is to eliminate the product-specific protocols to provide a common set of protocols that can be used for program-to-program communications," Sundstrom explains.

"At the low end, this would be for terminal-to-terminal type functions; at the high end, IMS-to-CICS type communications; and from the low end to the high end, a personal computer talking to a mainframe."

— *John Dix*

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51. Management
    VP, Dir., Mgr., Head, Chief: MIS/DP, Systems Application Development, Operations, Office Automation
52. Supervisory/Staff: Supervisor, Head of System Design, Analysis, Applications

Others

75. Consultant
80. Educator
85. Financial Analyst
90. Marketing/Sales
95. Other ____________________

3

Job Function

Which one of the following best describes your functional involvement with communications (data, voice, and/or video) products? Circle ONE only.

Corporate

1. Business Management, Planning and/or Development

Communications System/Network

2. Management, Planning and/or Development
3. Implementation and/or Operation
4. Other ____________________

4

Which one of the following best describes the primary business activity of your organization at this location? Circle ONE only.

Consultants

11. DP/Communications Consulting Services
12. Consulting Services (except DP/Communications)

End Users

13. Manufacturer (other than computer/communications)
22. Finance/Banking/Insurance/Real Estate
23. Education
24. Medicine/Law
25. Wholesale/Retail Trade
26. Public Utility/Transportation
27. Mining/Construction/Petroleum Refining/ Agriculture/Forestry
28. Business Services (excluding DP/Communications)
29. Government: Federal
30. Government: State/Local

Vendors

41. Carrier: including AT&T, BOCs, Independent Telcos, Public Data Networks, Intern'l Records Carriers
42. Interconnect
43. Manufacturer Computer/Communications Equipment
44. Value Added Reseller (VAR), Systems House, Systems Integrator
45. Distributor
46. DP/Communications Services (excluding consulting)
95. Other ____________________

5

In which ways do you typically become involved in acquiring communications products (data, voice, and/or video) and services? Circle ALL that apply.

1. Recommend/Specify
2. Identify/Evaluate Potential Vendors
3. Approve the Acquisition
4. None of the Above

6

Check ALL that apply in columns A and B.

A. I am personally involved in the acquisition process (specification, selection, approval) for the following products and services:

B. These products and services are presently in use at this location:

	A	B	*Product/Services*
Computers			
01.	☐	☐	Micros
02.	☐	☐	Minis
03.	☐	☐	Mainframes
Data Communications			
04.	☐	☐	Communications Processors
05.	☐	☐	Comm./Networks Software
06.	☐	☐	Digital Switching Equipment
07.	☐	☐	Facsimile
08.	☐	☐	Modems
09.	☐	☐	Multiplexers
10.	☐	☐	Protocol Converters
11.	☐	☐	Network Mgmt. & Control
12.	☐	☐	Test Equipment
13.	☐	☐	3270 Controllers
Telecommunications			
14.	☐	☐	PBXs
15.	☐	☐	Key Systems
16.	☐	☐	Central Office Equipment
17.	☐	☐	Integrated Voice/Data Terminals

	A	B	*Product/Services*
Transmission/Network Services Equipment			
18.	☐	☐	Microwave
19.	☐	☐	Satellite Earth Stations
20.	☐	☐	Local Area Networks
21.	☐	☐	Wide Area Networks
22.	☐	☐	Packet Switching Equipment
23.	☐	☐	Fiber Optic Equipment
Communications Services			
24.	☐	☐	Packet Switching Services
25.	☐	☐	Cellular Mobile Radio Services
26.	☐	☐	Electronic Mail
27.	☐	☐	Enhanced Services
28.	☐	☐	Centrex

7

Estimated value of communications systems, equipment and services:

A. which you helped specify, recommend or approve in *last* 12 months? Check only ONE in column A.

B. which you plan to specify, recommend or approve in *next* 12 months? Check only ONE in column B.

	A	B	
1.	☐	☐	Over 10 million
2.	☐	☐	$5-10 million
3.	☐	☐	$1-5 million
4.	☐	☐	$500,000-1 million
5.	☐	☐	$250,000-500,000
6.	☐	☐	$100,000-250,000
7.	☐	☐	$50,000-100,000
8.	☐	☐	Under 50,000
9.	☐	☐	Don't know

8

Estimated gross annual revenues for your entire company/institution:

Circle only ONE.

1. Over $1 billion
2. $100 million to $1 billion
3. $5 million to $100 million
4. Under $5 million

9

Estimated number of total employees at this location:

Circle only ONE.

1. Over 5,000
2. 1,000-4,999
3. 500-999
4. 250-499
5. 100-249
6. 50-99
7. 20-49
8. 1-19

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companies are helping force the issue by specifying APPC compatibility as a procurement requirement (see *Network World*, March 24).

"Several large companies are doing that," observes Dixon Doll, chairman of the DMW Group, Inc., a consulting firm in Ann Arbor, Mich.

Doll warns, however, that the goal may be idealistic. He thinks it will be difficult to achieve total vendor independence. APPC represents many of the same fundamental notions SNA did when it was first introduced, Doll says.

"But when you look at the way the specific rules of the architecture happen to be implemented, you find that some of the original utopian design goals have been compromised or constrained for a variety of reasons like performance, cost-effectiveness or positioning."

Don Czubek, vice-president of Communications Solutions, Inc. in San Jose, Calif., agrees. "The migration to multivendor LU 6.2 networks is going to be a lot slower than most people believe. Users today have large hierarchical networks, and there is no real migration path to APPC," he said.

Control is another hurdle. "In a limited sense, I think networks of APPC nodes are reasonble," said Compton of General Electric. "But I get nervous about trying to run a network with lots of little nodes and no sense of central control. There's too much room for breakage."

APPC is on its way.

A victim of its eventual acceptance, however, may be proprietary vendor networks. "APPC may be the beginning of the demise of vendor networks like Decnet, Wangnet and Primenet," says Stecher of Software Research. In Stecher's view, APPC will strengthen the importance of SNA as a backbone network supporting multivendor APPC nodes. There will be no place for duplicative network architectures.

"Why should I connect machines using Decnet when I can support those nodes through APPC?" Stecher asks. "The process will be to slowly but surely get rid of those networks."

The positive side of this scenario is that non-IBM vendors will be more readily able to sell into coveted SNA environments.

APPC also may fundamentally change network design in terms of resource allocation. Some desktop computers today can process one million instructions per second and support 20 megabytes of disk storage. APPC offers peer-to-peer capabilities that will unleash these devices and eventually change, if not reduce, dependency on host processors.

"The mainframe is going to lose a lot of its presence but not importance," Stecher says. "The fact that it has to be in the middle will disappear." This is a marked departure from the hierarchical structure of SNA.

Besides potentially changing how processing horsepower is allocated in a network and how that change will affect processor design, the APPC environment will require software vendors to rethink and redesign their products, Stecher predicts. "Software vendors have to come up with a whole new generation of truly distributed applications."

What should users do in light of these developments?

"In specific areas where the direction is reasonably clear, I think users should begin writing some of their own applications, certainly in the CICS area where IBM has already provided the interface," consultant Kutnick advises.

"Develop where the products are out and interfaces [are] defined. But don't limit your options. I wouldn't spend a lot of time or money on it. I would leave it primarily to the vendors at this point."

Stecher offers a counterpoint: "Some users have already started the process of training programmers to write everything to LU 6.2. They will be ahead of [their competition] before the off-the-shelf applications are available." ☑

> *"APPC also may fundamentally change network design in terms of resource allocation. APPC offers peer-to-peer capabilities that will eventually change, if not reduce, dependency on host processors."*

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August 4		ISDN	
August 18	Network Management/ Test Equipment		
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September 8			NCC-Telecommunications '86 Atlanta, GA
September 15	Broadband Local Area Networks		
September 22			T.C.A. Show San Diego, CA
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October 20	Baseband Local Area Networks		
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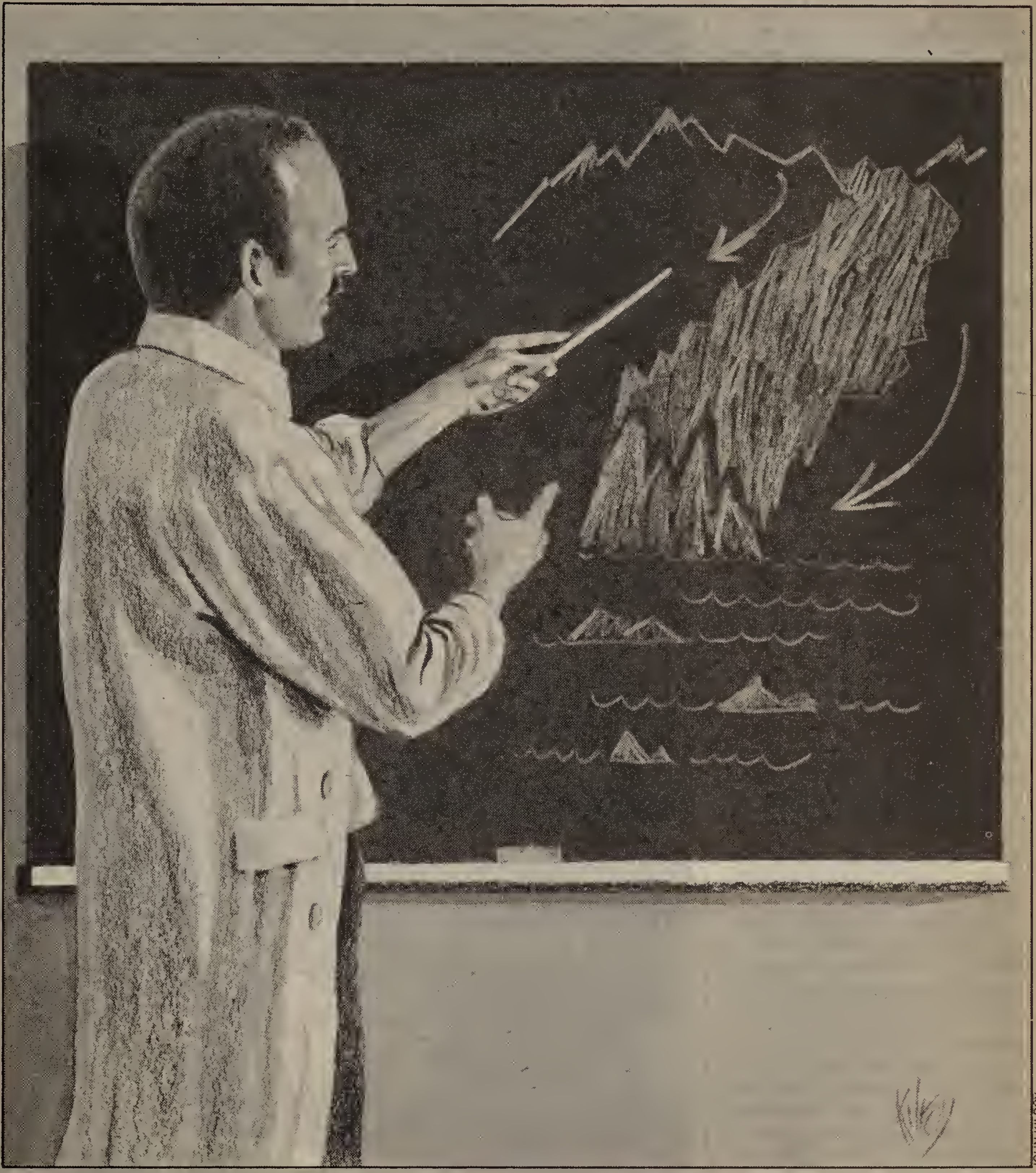
▶ A NETWORK ARCHITECTURE PRIMER

Does might make right?

BY PAUL RAMPEL
Special to Network World



JOHN KILROY

Data communications has supplanted data processing as the most critical issue facing MIS managers today. Even though hardware costs have plummeted, few managers are making major MIS purchases. Buying more hardware is not a solution if that hardware cannot work with what is already in the shop.

Users need a painless, effective way to establish direct interconnections between systems. They want to share data and applications in as transparent a manner as possible, without regard to where they are located.

While many schemes have been proposed, few have become either sufficiently stable or widely enough supported to constitute viable industry standards.

New needs of data communications

Data communications used to mean providing remote access to host-based applications. It comprised a set of I/0 output devices connected via cabling or a set of data concentrators to a remote central mainframe. The object was to minimize hardware costs.

As the price of hardware plummeted and users demanded more services from the network, remote access became a less efficient and less desirable solution. The dramatic increase in the number and variety of devices also reduced the efficiency of relying on a mainframe host.

A better answer is distributed processing, an approach that actually encourages the use of diverse equipment that users can mix according to their requirements. Distributed processing places more stringent demands upon networking technology and addresses the main MIS issue — providing access to data.

Data communications within a given manufacturer's product line is usually no problem because the vendor has design control over all of the machines, and connections can be standardized. Increasingly, however, vendors are finding new communications protocols both expensive and difficult to develop and market.

Establishing communication among machines from different manufacturers is another story. Even when machines are not deliberately incompatible, communications is not exactly easy. What passes as a hardware interface standard (such as RS-232) is open to interpretation and frequently results in a variety of incompatible implementations.

Communications standards

Worldwide, both the computer industry and academia have recognized the problem and have developed various standards to implement communications between different machines. These efforts are in various stages of development.

The oldest working standard is probably Transmission Control Protocol/Internet Protocol (TCP/IP), first developed for the U.S. Department of Defense's Advanced Research Project Agency Network (Arpanet) and widely used in Ethernet systems. It provides for reasonably efficient, error-free file transmission between disparate systems, has been in place for five to 10 years and is well-understood and documented.

But TCP/IP is mainly a file transfer protocol. It can send large files of information across a sometimes unreliable network with great assurance that the data will arrive uncorrupted. The protocol does not, however, address the problem of true distributed processing. For example, it does not allow a user on one machine to access an application on another machine transparently.

The Xerox Network Standard (XNS), developed at the company's Palo Alto, (Calif.) Research Center (Parc), allows transparent connections between machines and sharing of applications on the network. Certain parts of the standard, such as the Ethernet specification, are extremely well-developed, well-known and widely used.

Other parts are considered proprietary to Xerox, and are only sketchily documented. While the whole ensemble may work marvelously and provide unparalleled connectivity between Xerox's own machines at its Parc laboratories and elsewhere, XNS is not sufficiently known on the outside. Nor are there second sources of XNS hardware and software to relieve managerial paranoia about relying on a single vendor.

Another scheme, General Motors Corp.'s Manufacturing Automation Protocol (MAP), was demonstrated by the company in November at the Autofact '85 show in Detroit. The demonstration worked amazingly well, allowing transfer of data between a large number of machines from many manufacturers with a minimum of problems.

As with TCP/IP, however, the focus of the protocol is on passing messages reliably, not on true distributed processing. This is not surprising, considering that MAP was designed with machine tool control, rather than business applications, in mind. MAP is still in the process of being defined and will take several years to mature.

Rampel is president of The Orion Group, Inc., a software consulting and development firm in Berkeley, Calif.

☞ Continued on **page 36**

Continued from **page 35**

The most well-known intermachine communications standard isn't really a usable standard. The seven-level Open Systems Interconnect (OSI) model from the International Standards Organization (ISO) is a collection of standards that define each of the model's levels.

The definitions are most stringently defined at the lower levels (wires and voltages). National standards bodies and the ISO are still in the process of defining the highest levels of the protocol.

An incomplete solution

While the OSI model will almost certainly evolve into a worldwide standard eventually, it fails to provide a complete solution. It does not address the problem of network management: keeping track of who is on the network and how to reach them.

A group of some 20 companies, including IBM, have joined in the Corporation for Open Systems (COS) to define narrower, more usable standards that are based on the OSI model. But while COS is at work, IBM is busy shipping its own standard: Systems Network Architecture LU 6.2.

It seems likely that COS will eventually either adopt IBM's standard or come up with a completely new solution.

So what about SNA? SNA has been around about as long as TCP/IP and has gone through almost as many changes.

Although it started out as a means of passing information between mainframes and terminals, it has been broadened to include mainframe-to-mainframe communications and peer-to-peer exchanges, in which one device on the network can send messages to another without host involvement.

Peer-to-peer communications has grown increasingly important now that users have so much processing power on their desks.

SNA connects all of IBM's mainframe and minicomputer lines, and even connects Personal Computers now that SNA is a part of the Token Ring access method.

Such is IBM's clout that other manufacturers provide SNA links from their systems, even where they do not provide links to any other vendors' systems.

SNA has many detractors, whose primary complaint is against IBM itself. Many computer professionals abhor the company's dominant role in the marketplace.

> *“Peer-to-peer communications has grown increasingly important now that users have so much processing power on their desks.”*

But whatever else might be said about it, IBM's sheer size and succcess have made SNA impossible to ignore.

Users criticize SNA as cumbersome and inefficient — an excuse for IBM to sell hardware. But these barbs miss the point. SNA has been an evolving standard with a primary emphasis on functionality, rather than speed. As the cost of CPU power approaches the cost of sand, this strategy has been vindicated.

Critics also question what will happen to users if IBM decides to change SNA's specifications. IBM is as much a prisoner of its own size as everyone else.

Continued on **page 37**

Continued from **page 36**

For example, although non-System 360 architectures have surfaced during the last 10 years, IBM shows no signs of abandoning the older architecture.

This is for good reason. The primary problems of end users are related neither to the 360 hardware nor to its operating systems; hence there is little motivation for IBM to incur the cost of upgrading.

Even SNA's critics recognize that the backing of a company the size of IBM has its advantages. After all, in an era when maintenance and development costs for software have been major data processing department budget items, a stable source of software that someone else maintains is like manna from heaven.

> *“What the user sees is a seamless interface to a large variety of applications that appear to be running on a desktop workstation.”*

IBM has published detailed documentation on the design and specifications for all levels of SNA and has continued to upgrade, support and maintain it. The facility for logical peer-to-peer communications (LU 6.2) was introduced more than five years ago and has spread rapidly through the IBM product line to become the most common protocol available for connecting IBM systems.

With LU 6.2 in place, corresponding changes have occurred within the network control components. And the coincident introduction of Physical Unit (PU) 2.1 has resulted in the distribution of network control throughout the network, again diminishing the role of the host system.

In SNA, all of the low-level protocol conversions are handled out of sight. What the user sees is a seamless interface to an extremely large variety of applications that appear to be running on a desktop workstation.

IBM is beginning to introduce application programs that take advantage of the broad range of services available through LU 6.2. The company has defined and made available the Document Interchange Architecture and Document Content Architecture, which are both built on top of LU 6.2.

Moreover, IBM has invested significant amounts of time and money in defining and implementing SNA Distribution Services, a store-and-forward service, and the Distributed Office Support System.

There are also a number of software houses offering SNA for original equipment manufacturers, including those producing Unix-based systems. These implementations provide vendors with a passport to IBM's next-generation networking scheme, which stands to take on the mantle of an industry standard. For user installations configuring their own distributed processing systems, third-party implementations provide a way to take advantage of new CPUs, new applications and new facilities within a cohesive network.

When third-party vendors tie into IBM, they also tie into each other. SNA is going to become the standard; it has the momentum. IBM, the Goliath of computer companies, is squarely behind it. Think about it. Everything is over but the shouting. ◻

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▶ THE SNA OFFICE

Whether or not you have an IBM shop, bone up on IBM office automation basics

By Stephen J. Randesi

IBM is moving aggressively into the office communications market to establish a fully integrated, architecturally compatible set of products for office users. The company's first steps toward comprehensive office communications involve several products that fit within the overall IBM communications framework, Systems Network Architecture.

Prominent among IBM's SNA-related software offerings are Advanced Program-to-Program Communications (APPC), Document Interchange Architecture (DIA), Document Content Architecture (DCA) and SNA Distribution Services (Snads).

APPC is a set of enhancements that make SNA more usable in a distributed processing environment (see in-depth APPC article on Page 31). As its name implies, APPC was designed specifically for program-to-program communications. This means that an application program on a mainframe, for example, can communicate directly with an application program on a personal computer. This type of program-to-program communications is new and requires a different set of communications protocols.

For use with APPC, IBM defined Logical Unit (LU) 6.2. LU protocols that govern interactions among physical units (PUs), which are the devices within a SNA network. Whereas other LU types are product-specific (LU 2 and 3 are 3270-specific), LU 6.2 is product-independent. IBM defined LU 6.2 to eliminate incompatibilities between LUs by providing a single, generic LU type that supports program-to-program SNA communications.

> *"Whereas other LU types are product-specific (LU 2 and 3 are 3270-specific), LU 6.2 is product-independent. IBM defined LU 6.2 to eliminate incompatibilities between LUs by providing a single, generic LU type that supports program-to-program SNA communications."*

DIA is an application-level architecture that addresses how documents and files interchange between dissimilar systems. It specifies the data structures and protocols that support common office communications functions such as electronic mail, document distribution and library searches.

DIA defines sets of services for office functions performed in the distributed processing environment. DIA services include document distribution services, document library services, application processing services and file transfer services.

Document distribution services define how documents are delivered from their source to other users in a network. Document library services support filing and retrieval of documents in libraries, as well as library searches. Application processing services provide the capability to invoke programs on a remote system. File transfer services define how to transfer files between network users.

DIA is independent of SNA and is compatible with other communications transport mechanisms. For example, as one of its many options, IBM's Personal Services/PC software can support DIA protocols on top of asynchronous transport-level communications. However, most IBM products that implement DIA do so using SNA as the transport mechanism.

Document Content Architecture (DCA) describes the data streams used to represent documents. It is typically used for text documents, but can also represent other types of data, such as graphics and user-defined bit streams. DCA currently supports two text data streams: Revisable Form and Final Form.

Revisable Form DCA is similar to the internal data formats used by word processing systems in that Revisable Form documents can be created at one workstation and then sent to another workstation for revision. Final Form DCA documents, which are essentially unrevisable, are formatted for final display or printing.

DCA provides document compatibility across a diverse range of otherwise incompatible products, so that documents created on one system can be sent to another for further revision or for printing.

Snads support asynchronous communications between users on a network. In a direct LU-to-LU session, both the sender and receiver must be in session with each other before an exchange of information can take place. The communication is synchronous. With Snads, communications can be asynchronous, in that the receiving system does not have to be active when the sender transmits information. Sender and receiver do not need to be in direct session with each other: Snads take responsibility for distributing the information when the receiver becomes active.

Snads implement this asynchronous, delayed-delivery service via a store-and-forward mechanism employed at each Snads node in the network.

Distributed transaction programs at each of the Snads nodes work together to perform asynchronous data distribution. This set of transaction programs makes up the Snads network, also known as the distribution network.

The Snads distributed transaction programs, which communicate using LU 6.2 protocols, are executed in Distribution Service Units, located throughout the network.

The architectures and protocols described above are strategic to IBM office systems and will be implemented in all of IBM's future office products. By positioning APPC, DIA and DCA as new de facto standards, IBM has upped the ante for its competitors in the office systems market. Manufacturers whose systems are to coexist in IBM networks must support these architectures and protocols.

APPC and DIA/DCA support is available for non-IBM systems from independent suppliers such as Communications Solutions, Inc. of San Jose, Calif., which offers a portable set of C language programs that implement SNA LU 6.2 protocols and DIA protocols.

Integrating portable software into non-IBM systems is a quick and cost-effective means to enable them to communicate in IBM-dominated offices. ☑

Randesi is vice-president, Communications Solutions, Inc., San Jose, Calif.

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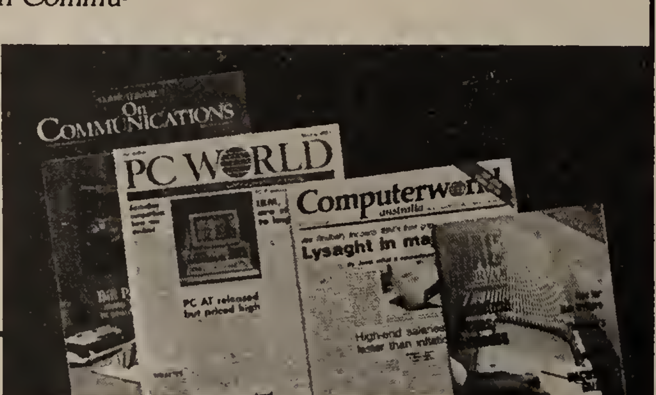
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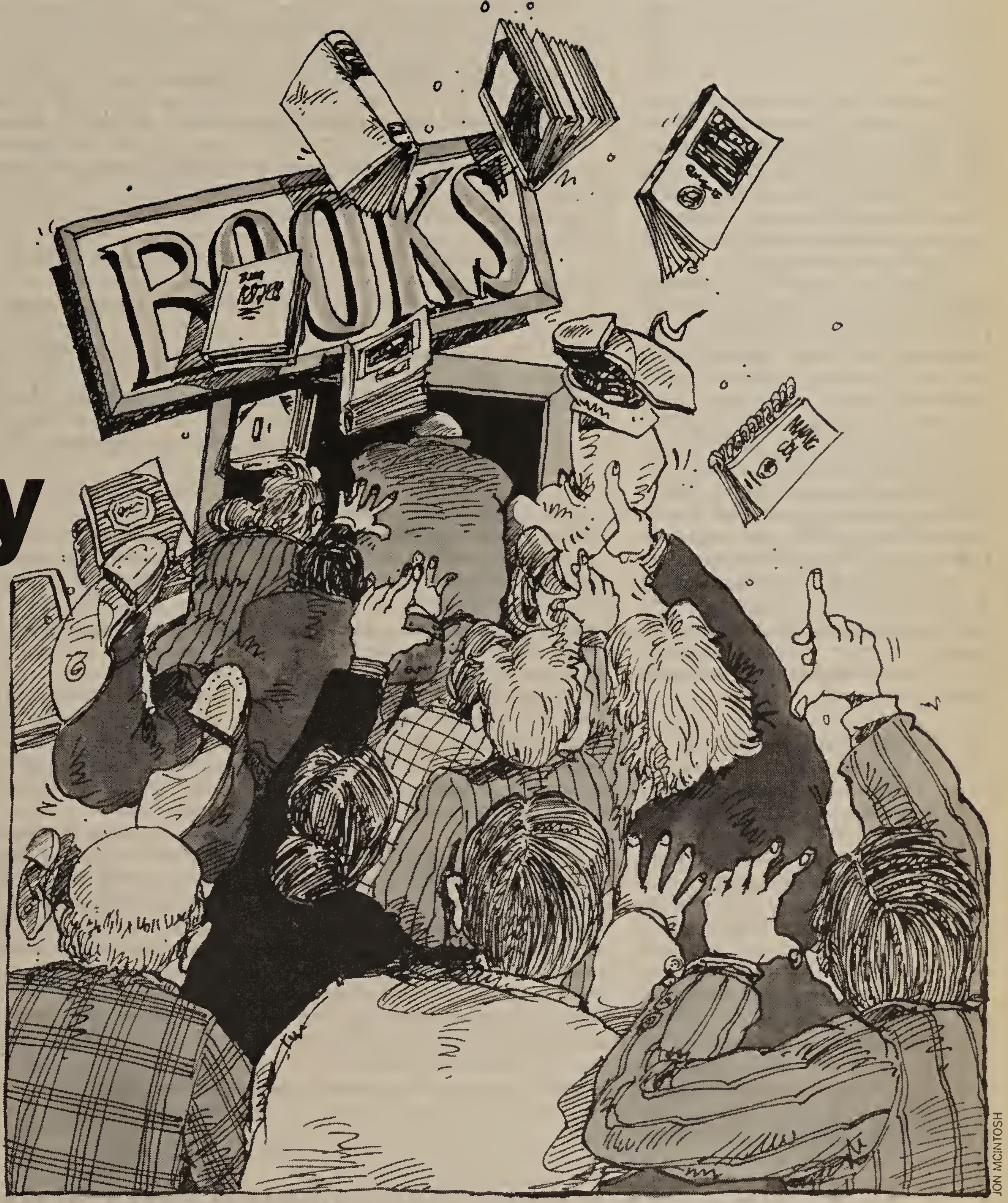
▶ CONTINUED FROM PAGE ONE

Seeking solidarity

influence the destiny of vendors' products.

Customers who want to join a support organization can choose among three basic categories. Industrywide groups like the International Communications Association (ICA) or the Telecommunications Association assist members by covering a variety of products and services. Industrywide groups that provide ongoing courses and seminars at their yearly conferences are an excellent source of educational support in all aspects of networking. They're also a great place for users to hook up with other managers to discuss alternative networking applications or products.



JON MCINTOSH

The Manufacturing Automation Protocol/Technical and Office Protocol Users Group of the Society of Manufacturing Engineers is an example of a newly emergent second category of users groups that are concerned with refining specific standard industry protocols.

The youth and competitiveness of the communications industry explains the scarcity of a third type of users organization, the vendor-specific group. However, as products continue to mature, customers instinctively huddle together to seek out more information about their networks. This commingling gives users a golden opportunity to blare directly into the vendor's ear. Sponsors of vendor-specific users groups are usually either vendors or independent customer committees that interact with vendor product managers.

A group of Ungermann-Bass, Inc. customers formed the Ungermann-Bass Net/One User Group in 1985 to focus and prioritize precisely what users want from Ungermann-Bass products. The group's two yearly conferences, which include vendor presentations, provide a forum for discussing any problems a manager might have when installing the product or when dealing with maintenance and quality issues. In addition, an adjunct advisory board helps address specific technical questions.

Just how much punch a users group packs when trying to influence a product's destiny varies, but as Allen Boggs, president of the Ungermann-Bass group explains, it is tough for a company to ignore a forum of its best customers.

"User groups are a great source of input for vendors," he says.

"Their existence doesn't mean that there is a problem with a product. Someone may be new to the vendor's line and just looking for some help. Customers who tend to get involved in user groups are usually the leaders in their field. Their input can be a company's best market research tool."

Boggs helped start the group by approaching an Ungermann-Bass sales representative because it was "the only real way to find out who other users were and to tackle the initial expenses of mailing and organization."

Otherwise, he observes, customers without representation might be at the mercy of the vendor's local sales staff. Sales forces can be ill-prepared to fully serve customer interests while competing with other products because, asserts Boggs, "they can't be up on what everyone is doing with a particular device."

Giant vendors also tap their user community to determine future product strategies. Digital Equipment Corp.'s Users Society (Decus) operates as an independent institution, although DEC actively supports it. The association has regional chapters and divides its members within each chapter according to the equipment they own and by their special interests.

DEC officials withhold confidential company product information from customers, but they actively solicit feedback from Decus members. According to one company spokesman, user input has often played a role in extending the life of a product. Members of users groups like Decus or Centrex may also belong to larger umbrella organizations such as the Network Users Association (NUA) or the ICA.

Continued on **page 40**

From page 39

It was the customer clout of a Midwestern Centrex users group that facilitated Illinois Bell's research for its imminent implementation of an integrated services digital network. McDonald's Corp. will be giving the system a dry run later this year.

According to Dick Jennifer, the Centrex group's president, the organization is in constant contact with Illinois Bell product managers rather than with account executives because the latter cannot answer all customer questions about the future of the service.

"When we talked to product managers, things started to happen," Jennifer recalls. "Out of our meetings, we have accomplished overall product improvement, helped to modify tariffs and have even sped up product delivery."

Jennifer's group is part of a national organization that is purposely disjointed because tariffs differ from region to region. Since the divestiture of AT&T, the organization has grown from three members to 100 members representing 50 companies. The organization's periodic meetings are also a welcome forum for other vendors to introduce products that interact with Centrex services.

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Not the only company in town

More significantly, Jennifer notes that Centrex users groups have worked to push the Bell operating companies out of their "only company in town" mentality by encouraging them to be competitive.

"The BOCs' old procedure was to determine internally what a product should be, create it and then tariff it," she says. "When it wouldn't sell, they would repeat the entire process of redevelopment. Now they often come to us first to understand our needs."

The NUA and the ICA, like vendor-specific organizations, conduct meetings, but differ in that they immerse themselves in general networking issues rather than zeroing in on one communications vendor or product.

NUA President Michael Harrop says that his organization does not speak directly to any specific equipment supplier, but interacts with a variety of manufacturers' associations.

"The vendors want to hear our strategic objective and not our technical solutions," says Harrop. "We share concerns with our suppliers simply to promote a dialogue with them. 'They may not always agree with us," he adds, "but sometimes our requirements are not realistic. If that's the case, we want the vendor to explain why. If the job is technically impossible, maybe we have to change our requirements. If the job can't be done because of someone's marketing strategy, maybe we have to change vendors."

Although the buying power of its members gives the NUA muscle with vendors, Harrop claims that success in negotiating with vendors is difficult to attribute exclusively to the NUA.

For example, he says, the formation of the Corporation for Open Systems (COS), a new vendor organization dedicated to research on development of the International Standards Organization's Open Systems Interconnect model, has encouraged the NUA.

Although the NUA has always pushed for the establishment of a multivendor organization like the COS, it is not directly involved with the COS at this time.

"We are watching the COS efforts closely and eventually hope to participate by offering a user view," Harrop says.

"Large vendors that initially disagreed with us on a number of issues — such as the need for service interfaces or third-party testing — are now setting up a means of third-party testing through the COS," Harrop adds.

Companies that are big spenders on communications services should be aware of the Committee of Corporate Telecommunications Users (CCTU), an ad-hoc group that has never lost a case before Congress, the Federal Communications Commission or any individual state regulatory commission in its nine-year existence.

The group represents between 30 and 40 of the biggest telecommunications customers, whose combined communications expenses constitute close to 10% of AT&T's entire revenue.

The bulk of the committee's work centers on representing member companies' interests in rate cases and other regulatory issues. The outcome of these cases could potentially affect the economies of members that are large public network communications users.

The CTTU's full-time staff includes a team of lawyers based in Washington, D.C. and Albany, N.Y. Separate subcommittees prepare testimony on policy positions that serve special interests within the organization. The power of this committee and the increasing presence of other users groups indicates that customers are more willing than ever to accept responsibility for the future of their corporate networks.

▶ CHECKLIST

A selection of communications users groups

The following is a list of communications users groups that offer customer services. Many vendors offer users membership in their own user organizations upon the purchase of the vendor's product. Because of space considerations, we could not list every organization. However, if your group was left off this list and you'd like other customers to know about you, write us at *Network World.*

Ad Hoc Telecommunications
Users Committee
1150 17th St. N.W.
Washington, D.C. 20036
(202) 861-2600

Association of Data
Communications Users (ADCU)
P.O. Box 20163
Bloomington, Minn. 55420
(612) 330-4601

Committee of Corporate
Telecommunications Users
399 Park Ave.
21st Floor
New York, N.Y. 10043
(212) 559-4900

Centrex User Group
CNA Insurance Co.
CNA Plaza
Chicago, Ill. 60685
(312) 822-5000
contact Dick Jennifer

Communications Managers
Association (CMA)
40 Morristown Road
Bernardsville, N.J. 07924
(201) 766-3824

Data Processing Management
Association (DPMA)
505 Busse Highway
Park Ridge, Ill. 60068
(312) 825-8124

Electronic Tandem Network User
Group
General Electric Corp.
8 British America Blvd.
Latham, N.Y. 12110
contact Stephen Scott

International Association of
Satellite Users (IASU)
P.O. Box DD
6845 Elm St.
McLean, Va. 22101
(703) 759-2094

International Communications
Association (ICA)
Suite 600
1775 K St. N.W.
Washington, D.C. 20006
(202) 293-2435

Network Users Association
(NUA)
Suite 400
2111 Eisenhower Ave.
Alexandria, Va. 22314
(800) 638-8510

Racal-Milgo, Inc. User Group
P.O. Box 3899
Los Angeles, Calif. 90051
(213) 742-4628
contact Richard Courtney

Society of Manufacturing
Engineers (MAP users)
P.O. Box 930
One SME Drive
Dearborn, Mich. 48121
(313) 271-1500

Telenet User Group (Telus)
GTE Telenet Communications
Corp.
12490 Sunrise Valley Drive
Reston, Va. 22096
1-800-TELENET
contact Janice Fero

Ungermann-Bass, Inc.
Net/One Users Group
Box 566
Wills Point, Texas 75169
For more information, contact a
local UB sales office.

— *Margie Semilof*

Pro from **page 22**

toward company advancement and career achievement.

Certification provides employees an incentive to improve their professional qualifications, education and on-the-job performance.

To end users, certification implies access to the most cost-effective, maintenance-free and versatile telecommunications and data communications networks.

The success of any certification program is contingent upon rigid standards. The merit of any certification program is measured by the efficiency with which it is administered, the strength of its curriculum and faculty and the comprehensiveness of its design.

Certification is not the answer for everyone. But preparing for certification will expose professionals to the latest equipment, procedures and technological advances. It will provide the communications industry with a new breed of aggressive professionals motivated to accelerate their companies into and beyond the information age.

Con from **page 23**

types of education and experience. Schools are now instituting degree programs that will prepare students to enter the field.

There is a sinister side to standardized certification: it tends to retard development. The airline industry's certification and regulation programs have inhibited the development of the field. A few years ago, airlines were deregulated. But, no one deregulated the regulators. The Federal Aviation Administration, for example, does a first-rate job with air traffic control, but its record of surveying and implementing new technology in the Flight Service Station modernization program or in its aeromedical branch is another story.

Any real need for certification of communications professionals has long since past. The competitive marketplace is protecting the consumer. Technology is developing rapidly and converging to de facto standards under market pressure. The certification issue appears to be asleep. May it expire quietly without awakening.

Broadcasting from **page 22**

teleconferencing marketplace, point-to-multipoint broadcast networks are a potentially thriving sector of satellite communications. Users pay a much higher price for the interactivity of video teleconferencing, which has not caught on because few firms have found a justification for an expensive, erratically used network designed for ad hoc communications.

Point-to-multipoint broadcast networks enable users to satisfy heavy one-way video and data communications needs economically. Potential applications include:

- Broadcasting video demonstrations that enable major retail firms to describe new lines of merchandise to their outlets nationwide.
- Quickly and simultaneously communicating details of complex union contracts to personnel departments nationwide.
- Teaching new techniques to employees at multiple locations.

Despite the array of applications for point-to-multipoint communications, the market for corporate broadcasting systems is sluggish.

ISDN from **page 23**

were limited to being suppliers of commodity bandwidth and value-added network services that monitor the network but do not introduce information content, for example, network management services. At the very least, even if AT&T, its former Bell operating companies and other carriers are eventually allowed to offer information content services, they must be permitted to do so only through arm's-length subsidiaries.

Second, the concept of the common carrier must not be lost. All companies that offer services over the public ISDN must continue to be required to provide equal access to all such services at a fair price to all comers. Failure to retain this essential regulatory precept will result in a proliferation of ferrymen refusing passage at whim or auctioning it off to the highest bidder.

The ISDN could go far beyond merely integrating voice and data. It may integrate access to and delivery of virtually all information, and today's ISDN ninnies may become tomorrow's gurus.

Alaska from **page 1**

In 1981, Software AG and the state joined forces to develop a distributed data base network, a much-ballyhooed concept that is struggling to be transformed into reality.

A true distributed data base setup would allow users to write programs requiring information from multiple data bases without having to specify in the application the location of the desired data.

While distributed DP vehicles such as IBM's LU 6.2 are stealing headlines these days, Alaska's experience seems to illustrate the difficulties involved in actually implementing distributed DP. The weakest link in the state's efforts seems to be the communications network, which ties the Anchorage and Juneau data centers via digital microwave links. The process of routing information requests and retrieving and transmitting remote data has led to overly long response times.

Ralph Wesser, data base administrator for the state, said users had to compete with existing traffic on the 14.4K bit/sec microwave network.

"Communications over the network were not anywhere near as fast as cross-region communications within a single processor," Wesser said.

Over the network, the distributed data base system was originally intended to allow users to run programs that could submit requests for data, regardless of the physical location of that data.

The data base management software, whether running on a local or remote processor, would pull the appropriate data and transmit it back to the processor hosting the application.

The state has an IBM 3081 running VM and an IBM 3084 under MVS/XA in its Juneau facility. These mainframes support four separate data bases under Software AG's Adabas DBMS. The state's Anchorage data center features an IBM 4381 running VM and an IBM 3090 running MVS/XA hosting five Adabas data bases.

All four processors communicate with one another through the network. A third data center located in Fairbanks is not currently tied to the network because its host processor is running Cullinet Software, Inc.'s IDMS/R DBMS, according to Wesser.

In addition to Adabas, the state has used Software AG's Adabas/Vtam and its data dictionary software to route data access requests and maintain information on where data physically resides. Alaska's project is a trial run of the company's so-called Adanet distributed data base management system, which a company spokesman said will be released before the end of the year. In its commercially available version, Adanet's data dictionary is expected to maintain all information on data locations, freeing programmers from the task of embedding such knowledge in each application.

In addition to network-spawned delays, long response times were probably due in part to inefficient information requests, said Jim O'Leary, product manager with Software AG.

Compounding response time problems, the Alaska distributed data base implementation lacked the ability to synchronize data base updates across data base boundaries. O'Leary said that, when released, Adanet will guarantee that updated data is synchronized across all nodes on the network.

Wesser claimed that the Alaska system implementors were also unable to select an application that would take advantage of distributed DP capabilities. "We don't have any project now, or any foreseen in the near future, that would require a distributed data base environment. If we did have the need for a distributed data base, the way the Adabas network software runs now, it would have to be a pretty special application for us to be able to take advantage of this capability."

When asked about the traffic the network currently supports, he replied: "No one is using it. We use it only occasionally to transfer Natural programs between sites." Natural is Software AG's fourth-generation language.

The project's future is bleak. The state's revenue stream has been reduced to a trickle by the recent severe decline in oil prices. Wesser said there is talk of the state removing all the networking software from the machines.

Although the Alaska experiment appears to be halted, Software AG contends that the distributed data base system is currently being used at other sites. One such setup cited by the company is TRW Electronics, Inc.

But Jim Keebaugh, a senior project engineer with TRW's Colorado Springs branch, disagrees. He said he would not describe the company's Vtam network as true distributed DP. "[The network] is more or less several mainframes linked together." The mainframes are connected with data lines operating at 9.6K bit/sec, he added.

"We have an [IBM] 4381 in Los Angeles and an IBM 3083 in Colorado Springs that both have Adabas, but they can't talk to each other. We use the Software AG product mostly for local-processing applications," he explained.

O'Leary maintained the problems encountered by net users in Alaska would not alter Adanet's introduction date. "Adanet will establish a higher level layer of software that supervises all communications with all network nodes and data bases."

Maintenance from **page 2**

third-party service company are roughly 20%, depending on the type of equipment involved.

Glen Dawson, principal consultant with Service Research Group, a Palmyra, N.J.-based consulting firm, claimed that third-party service firms offer less service for less money, while a company like IBM may give users more service then they need.

"The third parties let users tailor their coverage," he said. "That is one way the customer will save."

Users are often forced into third-party maintenance contracts for several reasons. The original vendor may not have its own service crew. Or the vendor may lack the resources needed to service remote sites. In some cases, customers spurn manufacturer maintenance due to unsatisfactory service.

While there are currently few independent companies competing to offer third-party service, multivendor service units are beginning to appear within large manufacturing companies or as separate subsidiaries. For example, Bell Atlantic Corp. has purchased Sorbus, Inc., and US West, Inc. has purchased US West Information Systems, formerly Interline Communications Services, Inc., to provide total maintenance solutions.

According to Chet Brown, manager of new ventures at Xerox Corp.'s Business Systems Group in Rochester, N.Y., the communications business has a difficult time defining what service is because, prior to the breakup of AT&T, users were not used to owning communications equipment.

"Service truly depends on the product the company is trying to maintain," he said. "No one has ever packaged a McTelephone Repairburger before. Vendors have to figure out what is service to something that has always been a service product."

▶ COMPUTER III

Vendor troika makes pitch to FCC

BY KARYL SCOTT
Washington, D.C. Correspondent

WASHINGTON, D.C. — IBM, Tymnet/McDonnell Douglas Network Systems, Inc. and Pacific Bell recently embarked on an unprecedented move to influence the outcome of the Federal Communications Commission's upcoming Third Computer Inquiry, or Computer III.

Computer III will define new regulations dealing with AT&T and the Bell operating companies' provision of enhanced data processing services as part of their core business operations. In accordance with the strictures of Computer II, those firms must offer enhanced services separate from their regulated telephone business. They must also use separate accounting procedures and facilities.

Representatives from the IBM-Tymnet-Pacific Bell troika recently met with FCC members to outline their suggestions for dealing with enhanced services. One of the related issues is the provision of comparably efficient interconnections to enhanced service providers. Those providers compete with AT&T and the BOCs, but also rely on them for transmission and interconnection services.

Under the proposed FCC Computer III framework, AT&T and other dominant carriers must provide the same level of interconnection between AT&T's network and the competitor's network as AT&T would provide to itself. In other words, AT&T cannot provide an inferior quality interconnection to its competitors. This represents the concept of comparably efficient interconnection.

The corporate trio proposed a set of seven guidelines the FCC could incorporate into its new regulations to ensure a comparably efficient interconnection.

- Transparency of transport to the user.

- Support of a variety of terminal protocols to enable users to obtain the range of services needed.

- Provision of comparably efficient interconnections to enhanced service providers by dominant carriers only when the dominant carrier offers a similar service.

- Unbundling of network building blocks by the dominant carrier so that enhanced service providers pay only for those components needed.

- Provision of network interface information as long as it is not proprietary.

- Incorporation of integrated services digital networks in comparably efficient interconnections.

- Incorporation of comparably efficient interconnections in new services to ensure a choice of service options to end users.

Comparably efficient connections are only one consideration within the scope of Computer III. Other regulatory issues include cost accounting techniques to prevent cross subsidization of profitable and unprofitable services, treatment of proprietary information and provision of underlying transmission at tariff rates.

"Our original worry was that the dominant carrier could restrict the types and quality of service we could offer,"Warren Prince, president of Tymnet, said. "If they were not forced to offer comparably efficient interconnections, they could restrict business for themselves. Ensuring comparably efficient interconnections ensures greater development of new services for users," he said.

ENA from **page 1**

the older communications processor.

First Chicago Corp., a Midwestern bank, moved to the latest Vtam release last fall in anticipation of future IBM software products. "We had already moved to IBM's MVS/XA and thought that most new products would require the latest release of VTAM as well as MVS/XA," noted James Abraham, manager at First Chicago's network services group.

American Airlines, which has its principal data center in Tulsa, Okla., migrated to the latest Vtam release last September in anticipation of a future IBM IMS data base management system facility known as the Extended Recovery Facility (XRF). XRF, an automated data base backup facility, was announced in February 1985 and is scheduled to be released in the third quarter of 1986. It requires the latest release of Vtam.

American Airlines is interested in the new facility because it promises to significantly reduce the time needed to recover a downed IMS data base. That procedure typically takes 45 minutes, said Wayne Pendleton, manager of system programming at the airline. Pendleton is responsible for all of American Airlines' data processing, with the exception of the company's reservation system.

XRF will automatically switch users from the fallen data base to a spare IMS facilty, a procedure that will take roughly 10 minutes. Typically, 600 American Airlines employees access IMS at any moment during each work day, according to Pendleton.

Moving to the latest Vtam release did not present major problems for American Airlines. One day each month, various hosts are loaded with changes to the Vtam list — a directory of devices and routing tables that a Vtam-equipped host oversees. Pendleton estimated that each month the number of changes to the Vtam list varies from 50 to 500. Last fall, after the latest Vtam release was tested, it was installed in place of the monthly changes. Pendleton reported few problems with the installations.

American Airlines has not yet incorporated one feature included in the latest release, Extended Network Addressing (ENA), which increases the number of hosts an SNA network can support from 64 to 256, and the number of logical units from 64,000 to eight million.

Presently, American Airlines is well below old Vtam limitations and uses only eight hosts and 45,000 logical units. However, the company plans to incorporate ENA by the end of this year.

The airline's situation is typical of many other corporations, according to Don Czubek, vice-president at Communication Solutions, Inc., a San Jose, Calif., consulting firm. "Even though only some of the largest companies need ENA today, most realize they will soon require it," Czubek commented.

A number of companies had encountered difficulties using ENA with Transaction Processing Facility (TPF), an IBM offering designed to support large financial institutions and airlines [*Network World*, March 24]. Since American Airlines does not use TPF, Pendleton does not foresee any major problems incorporating ENA.

However, there could be a few minor problems. American Airlines has two IBM 3725 and two IBM 3705 front-end processors. ENA does not fully support the IBM 3705, so American Airlines plans to upgrade to the IBM 3725.

"There are a lot of [IBM] 3705s still in use, and that will create some problems for large companies," Czubek noted. He added that companies can implement a subset of ENA that supports the IBM 3705 and gradually upgrade to the newer model. However, to run all ENA features, companies will have to get rid of the older front-end processors.

Because ENA uses a different addressing scheme than other Vtam releases, companies will have to closely examine their network. "Two devices may have the same network address, and one will have to be changed," noted David Passmore, group manager of the network architecture and protocol group at Network Strategies, Inc., a consulting firm in Fairfax, Va.

First Chicago, which has five hosts and 1,000 logical units on its network, followed Czubek's advice. Although the company does not require ENA, it was included when the new release of Vtam was installed last fall.

Alternatives from **page 2**

Inc. was continually defending its wiring system, which is based on a star topology and uses wiring concentrators, said Harry Saal, senior vice-president of the Palo Alto, Calif., company.

Since IBM's announcement last October of the Token-Ring Network, Nestar has seen increased acceptance of its products, Saal said. The company will soon ship a Token-Ring-compatible server.

But users continue to install Datapoint Corp. Arcnet-type local nets, Passovoy said. The dealer shares user hesitancy about the Token-Ring Network. Passovoy said he won't recommend the network until it's been in use for a while. "It has a new operating system, new hardware and a lot of unknowns about the cabling," he said.

For users who need a network now, but are reluctant to go with IBM's Token-Ring Network, Passovoy recommends a linear-bus network running Novell, Inc.'s Advanced Netware 2.0. The latest version of the network operating software supports up to four network topologies.

To date, only a handful of client companies have asked network consultants Brown & Associates, Inc. in Natick, Mass. to install the Token-Ring Network, said vice-president Ray DiCasparro.

He noted the Token-Ring Network appeals most to companies that have a base of IBM equipmen. Some firms have already put in Novell networks while waiting for the Token Ring, DiCasparro said.

Brown has been selling Pronet token-passing networks from Proteon Associates, Inc. Pronet's 10M and 80M bit/sec networks can use IBM Type 1 twisted-pair cabling. The Natick, Mass. vendor plans to offer a Token-Ring-compatible network running at 4M bit/sec.

IBM from **page 2**

integration of Personal Computers into IBM's network environment.

The announcements included the IBM Entry-Level Personal Computer 3270 Emulation Program, Version 2 of the IBM Personal Computer 3270 Emulation Program and Version 3 of the IBM 3270-Personal Computer Control Program, a communications enhancement for the 3270 Personal Computer.

The entry-level emulation program has an improved file transfer utility that reduces by up to 40% time required to transfer a file. Users can swap between a host session and a DOS session using a hot key.

Version 2 of the Personal Computer 3270 Emulation Program enhances 3270 emulation for standalone micros but can alse be used in a Personal Computer configured as a local network gateway.

Standalone, Version 2 provides access to mainframe resources through support of Personal Services/PC and IBM's Professional Office System.

The entry-level IBM Personal Computer 3270 Emulation Program costs $185. Version 2 of the emulation program costs $425.

IBM from **page 6**

Closs, manager of prototype systems with IBM's research division in Zurich. It discusses experimental work with higher speed token-ring networks.

Basing their work on the Token Ring's built-in priority setting capability, the IBM researchers designed and implemented special circuitry that permits simultaneous use of an IBM Personal Computer and an attached telephone.

According to Closs, "The Zurich approach involves a priority mechanism by which the ring is put into voice priority mode every few milliseconds. As soon as the speech prefix bits are detected, priority is established. In effect, this shuts all data transmissions out for a few milliseconds during which speech has the right of way."

This scheme allows flexible sharing of the ring's capacity between voice and data traffic. "Data may take advantage of unused voice capacity, and rings can be tailored to the particular voice/data needs of the attached stations," the article continues.

In a sample transmission, the telephone handset would be picked up and the Personal Computer screen would display a menu to help the user make the call. The user could then enter the desired number using the keyboard to exercise one of two menu-driven options.

The first involves selecting a connection that has standard telephone speech quality. The second calls for a high-quality speech connection for "improved intelligibility."

Other work is being done on a 100M bit/sec ring, a speed that requires the development of new ways to get workstation data onto and off of the network, what Closs calls insert and remove functions. Ultimately, high-speed local networks would be able to support voice as well as data, improving the efficiency of the transmission medium.

Besides the ability to prioritize tokens, voice communications is made possible on token rings because of their deterministic nature, according to Leonard Kleinrock, a professor of computer science at the University of California at Los Angeles and president of a seminar and consulting company, the Technology Transfer Institute in Santa Monica, Calif.

"You can guarantee a synchronous capacity to certain applications, like voice," Kleinrock said. "That's one of the big advantages of token rings."

The commercial availability of local networks that integrate voice and data is not that far off, Kleinrock contends. The desire for this integration will be driven by applications such as voice-annotated text and, ultimately, when you can go from voice to text, he said.

Yet not all agree that the voice and text combination will be available soon. One such foreboder is Eric Killorin, president of Hyatt Research Corp. in Andover, Mass., and publisher of PC Netline, a newsletter about networking.

"Merging voice and data is one of those things that sounds great," he said, "but the technology isn't there yet to support it in a meaningful way."

> *"In a sample transmission, the telephone handset would be picked up and the Personal Computer screen would display a menu to help the user make the call. The user could then enter the desired number using the keyboard to exercise one of two menu-driven options."*

Banks from **page 2**

to choose a vendor based on the variety of services offered, network robustness, bandwidth, security and cost."

In today's banking environment, communications is an integral part of doing business. "The days of stand-alone computing are gone," Conrad said. "Communications is now a key part of computing. And without standards, we will not be able to communicate."

Because of this critical need to exchange information, banks have traditionally been among the first to adopt new communications technologies. In many cases, banks have had to develop their own systems. Consequently, there is a wide variety of equipment, with differing levels of capabilities, in use within the banking community.

"Banks have tended to be early players in the communications arena," said Mark D. Stahlman, research analyst with Sanford Bernstein & Co. in New York. "If you look at banks, you see there are a lot of different types of equipment needing to communicate. Users want the freedom to choose vendors that answer their needs without having to worry whether equipment can communicate with the installed base. OSI will give them that freedom," he said.

Even though banks have been in the vanguard of communications, some banks admit to being late entrants to the OSI movement. "We could have been involved in OSI development earlier, but we couldn't wait for standards," said David Hanson, assistant vice-president for strategic planning at Citibank. "We had to take the equipment that was available and create our own systems. We're catching up now, and as technology matures, we will bring in new equipment that meshes with what we have."

Citibank satisfied its communications needs before recent OSI developments. It created a worldwide X.25 packet network, developed its own personal computer protocol, based loosely on OSI, and designed a bridge from that protocol to IBM's Systems Network Architecture LU 6.2. "Our thrust is automated financial transactions," Hanson said. "We need a vehicle to let the various applications talk to each other, independent of the machine, protocol or language used. OSI gives us a ubiquitous structure that allows any equipment to plug into any other equipment."

Large and small banks are showing increasing interest in vendors that support OSI and its subsets, Manufacturing Automation Protocol and Technical and Office Protocol. Banks are beginning to plan their communications strategies around evolving international standards.

"The World Bank just finished a three-year process of setting international standards for voice communications, mainframes, local-area networks and wide-area networking," Conrad said. "We're not about to throw all that to the wind just to accommodate the individual standards of a single vendor. We will make a purchase decision or delay a decision based on the level of commitment a vendor shows for OSI and ISDN."

This typical user sentiment has made many vendors sit up and take notice of OSI. Even industry giant IBM has said it will support OSI in conjunction with its own proprietary network architecture, SNA.

Acceptance of OSI standards is as important abroad as it is at home. "Each [Postal, Telephone and Telegraph] administration has its own standards," said Frank Dzubeck, president of Communications Network Architects of Washington, D.C. "Each is a kingdom unto itself, which makes it difficult to communicate across national borders," he said.

Most European nations are in the process of deregulating their telecommunications operations, which will further hasten international acceptance of OSI. As competition increases in those markets and user demand for OSI grows, Europeans may be forced to support it. Multinational banks, with their heavy international telecommunications requirements, are eagerly awaiting that development.

CAREER POSITIONS

Bay Area Teleport Is Hiring

Bay Area Teleport is a high quality Specialized Common Carrier in the San Francisco/Oakland Bay Region. A high capacity digital communications network connects Sacramento, the central California region, San Francisco, San Jose and Santa Rosa, to a gateway earth station complex with antennas up to 13 meters. These earth stations communicate with Pacific and Atlantic International satellites and all Domestic satellites. Headquartered in the advanced, high tech environment of Harbor Bay Business Park (Alameda, California) Bay Area Teleport offers fast paced, demanding employment opportunities for qualified communications professionals in the following areas:

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Calendar

April 9, New York — Advanced Lotus 1-2-3. Contact: Center for Advanced Data Processing, Suite 402, 450 Seventh Ave., New York, N.Y. 10123.

April 9, New York — Jazz. Contact: Center for Advanced Data Processing, 450 Seventh Ave., New York, N.Y. 10123.

April 10, New York — DisplayWrite 3. Contact: Center for Advanced Data Processing, 450 Seventh Ave., New York, N.Y. 10123.

April 10, New York — Microsoft Word for Macintosh. Contact: Center for Advanced Data Processing, 450 Seventh Ave., New York, N.Y. 10123.

April 14, New York — Introduction to dBase. Contact: Center for Advanced Data Processing, 450 Seventh Ave., New York, N.Y. 10123.

April 15, New York — Wordprocessing with MultiMate. Contact: Center for Advanced Data Processing, 450 Seventh Ave., New York, N.Y. 10123.

April 21-22, Chicago — Introduction to Telecommunications Technologies. Contact: TeleStrategies, 1355 Beverly Road, McLean, Va. 22101.

April 21-23, New York — Data Communications: Network Design, Integration and Applications. Contact: Software Institute of America, Inc., 8 Windsor St., Andover, Mass. 01810.

April 28-30, San Francisco — Telecommunications Systems: Technology and Planning. Also, May 27-29, New York; June 9-11, Minneapolis; June 23-25, Washington, D.C. Contact: Institute for Advanced Technology, 6003 Executive Blvd., Rockville, Md. 20852.

April 28-30, Boston — Network Users Association Spring Meeting. Contact: NUA, Suite 400, 2111 Eisenhower Ave., Alexandria, Va. 22314.

April 28-May 1, Dallas — Dexpo South 86. Contact: Expoconsul International, 3 Independence Way, Princeton, N.J. 08540.

April 30-May 2, Boston — Introduction to Data Communications. Also, May 7-9, New York. Contact: Systems Technology Forum, Suite 150, 10201 Lee Highway, Fairfax, Va. 22030.

May 1-2, Minneapolis — Communications and Information Security. Also, May 8-9, Washington, D.C. Contact: Ross Engineering Associates, Inc., 7906 Hope Valley Court, Adamstown, Md. 21710.

May 1-2, Washington, D.C. — Fiber Optics for the Non-Engineering Manager. Contact: TeleStrategies, 1355 Beverly Road, McLean, Va. 22101.

May 5-6, Washington, D.C.— Developing and Managing T-1 Networks. Contact: TeleStrategies, 1355 Beverly Road, McLean, Va. 22101.

May 7-9, Detroit — Understanding and Using the IBM Personal Computer XT and Personal Computer AT. Also, May 21-23, Kansas City; May 28-30, Seattle; June 4-6, San Francisco; June 9-11, Boston. Contact: The American Institute, Carnegie Building, 55 Main St., Madison, N.J. 07940.

May 7-9, Colorado Springs — Hands-On Troubleshooting of the Data Communications Network. Also, May 12-14, Washington, D.C.; May 14-16, Jacksonville, Fla.; May 21-23, Boston. Contact: American Institute, 55 Main St., Madison, N.J. 07940.

May 8-9, Washington, D.C. — The Wireless Future: Marketing Cellular and Other Wireless Technologies. Contact: Phillips Publishing, Inc., 7811 Montrose Road, Potomac, Md. 20854.

May 15-16, Washington, D.C. — Computer III: Establishing A Regulatory Framework. Contact: Phillips Publishing, Inc., 7811 Montrose Road, Potomac, Md. 20854.

May 19-21, Denver — Information Everywhere: Building the Industry Here and Abroad. Contact: Information Industry Association, Suite 800, 555 New Jersey Ave. N.W., Washington, D.C. 20001.

May 28-29, Boston — Planning the Next Generation of Telecommunications Networks. Contact: International Data Corp., Washington Division, Suite 240, 1500 Planning Research Drive, McLean, Va. 22101.

May 29-30, Washington, D.C. — Fundamentals of EDP Auditing. Contact: New York University, School of Continuing Education, Seminar Center, 575 Madison Ave., New York, N.Y. 10022.

May 30-June 2, Atlanta — The Society of Telecommunications Consultants Spring Conference. Contact: Society of Telecommunications Consultants, Suite 1410, One Rockefeller Plaza, New York, N.Y. 10020.

June 9-12, Boston — Network Management/Technical Control Conference and Exposition. Contact: CW/Conference Management Group, P.O. Box 9171, Framingham, Mass. 01701-9171.

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▶ PRODUCT REVIEW

V.32 Modem: All else pales?

BY JOHN J. HUNTER
Contributing Writer

The 9.6K bit/sec CCITT V.32 modem has probably attracted more user interest than any other modem introduced since the V.22bis. With the V.32, users get the best of all possible worlds.

The unit operates full- or half-duplex over the two-wire direct-dial network, transmits data at 9.6K bit/sec and is capable of forward error correction. Its main competitors, the Bell 209 (and compatibles) and the CCITT V.29, pale in comparison.

With so much going for them, one wonders why the V.32s have not swept the industry. Well, the answer is quite simple: They have only just become commercially available. While many companies have advertised 9.6K bit/sec V.32s, to this writer's knowledge, Concord Data Systems, Inc. is the only company currently delivering such a product. The V.32 Trellis modem first appeared at the Communications Networks show in Washington, D.C. last January.

The Concord Data V.32 Trellis operates at 9.6K bit/sec and 4.8K bit/sec synchronous over two-wire leased or dial-up lines in half- or full-duplex modes. It employs trellis modulation to perform forward error detection and correction. When operating at 9.6K bit/sec, the modem uses the V.32 recommended quadrature amplitude modulation signal-coding pattern, consisting of 32 distinct carrier states, or points. The modem signals at 2,400 baud and encodes five bits per baud. Four bits are for user data, and one is for trellis coding. Therefore, even though the total transmission rate is 12K bit/sec, only 9.6K bit/sec contains user data.

Forward error correction is not a new technology. The government has been using it for military and space applications for years. The main drawback of non-trellis techniques is that they can quickly run up the overall communications overhead. The overhead burden depends on the error-correction techniques will send one redundant bit for every data bit. While that most certainly will ensure error-free transmission, it also guarantees an incredibly high overhead.

bit for every data bit. While that most certainly will ensure error-free transmission, it also guarantees an incredibly high overhead.

Full-duplex transmission over two-wire circuits is not a new development either. The Bell 212A, CCITT V.22 and V.22bis modems all have this capability. Those products, however, use frequency-divided bands for sending and receiving signals. The problem with this technique is that it eats up the available voice-grade telephone line bandwidth and effectively limits the amount of data that can be transferred.

The secret behind the V.32's ability to transmit 9.6K bit/sec full-duplex over a two-wire circuit rests with a technique called echo cancellation. Echo cancellation isolates the signal received from the remote modem by eliminating interference caused by the transmitting signal, as well as reflections of the signal echoed back from near-end and remote-end central offices.

Echoes can be cancelled because there is a small time difference between when they are received and when the main signal is received. This time difference is due to propagation delays. Delay times are established when the modems independently train between the local office and the remote location.

With RS-366, a separate path for dial-sequence commands and telephone number digits is established from the terminal to the modem. The digital data passes to the modem via an RS-232-C interface. Unless the ACU is an integrated unit, a separate cable is required to carry the commands and data to the V.32. As far as can be determined, the new Concord modem will have the ACU built into the unit.

The Concord Data V.32 looks like a first-rate product. However, it does have some limitations. First, it operates in only a synchronous mode, which certainly limits its application. Concord is supposed to be working on an asynchronous facility, but no date for release has been set. The ACU employed does not support the Hayes Microcomputer Products, Inc. command set, which diminishes the modem's attractiveness since Hayes is the de facto industry standard. The Concord V.32's biggest drawback, however, is that it might have problems compensating for the delays involved with satellite transmissions. Concord Data Systems concedes that this might be a problem, but claims that they currently have customers using the product over satellite links without problems.

The Concord V.32 is offered as a stand-alone product and is priced at $3,495. Considering everything it does, that's a very good price.

▶ STANDARDS

Sun, GTE COS recruits

BY NADINE WANDZILAK
Staff Writer

ALEXANDRIA, Va.— The three-month-old Corporation for Open Systems (COS), whose goal is to promote the use of standards to make multivendor computer and telecommunications products and services compatible, has welcomed two new members — Sun Microsystems, Inc. and GTE Telenet Communications Corp.

COS, a nonprofit organization, also measures product compliance with interconnection standards.

Lincoln Faurer, 58, a retired three-star U.S. Air Force lieutenant general and former director of the National Security Agency (NSA), is expected to take the reins today as COS president.

"Lincoln Faurer brings to COS demonstrated leadership, experience in managing a highly technical organization and familiarity with NSA's multivendor computer and communications network, which is among the largest data networks in the world," said Thomas Chung, COS chairman and projects vice-president at Tandem Computer, Inc.

"Lincoln's ability to represent COS at the highest corporate and government levels, both domestically and internationally, combined with his proven skills in accommodating diverse interests while achieving common goals, are of immense value to COS."

COS members include AT&T Bell Laboratories, Control Data Corp., Digital Equipment Corp., Hewlett-Packard Co., Honeywell, Inc., IBM and Northern Telecom, Inc.

"The formation of COS is testimony to the fact that customers are demanding that vendors solve the incompatibility problems they have faced for years," according to Scott McNealy, Sun Microsystem's president and chief executive officer.

"Sun has demonstrated its commitment to open communications between vendors by publishing the protocols of Network File System and licensing it to vendors, universities and other organizations," McNealy said. "The fact that it has gained widespread acceptance as an industry-standard file system is an indication of how eager the industry has become to standardize network services."

Peter Waal, vice-president for strategic marketing and data communications at GTE Telenet, reiterated this support for industry standards the goal of full interoperability of dissimilar systems.

"Telenet is committed to the concept of the global electronic village," he said.

PBX from **page 4**

management functions of the System 75, including a menu-driven method for station moves and changes.

The PBX is "price competitive with the Japanese systems" that it is meant to do battle with, the source said.

Excalibur will most likely be sold through AT&T Information Systems' general business group to small businesses.

Simultaneous voice and data

Unlike other PBXs within AT&T's switch family, Excalibur will support what the company calls simultaneous voice and data.

Whereas the System 85 and System 75 integrate voice and data over the same wire pair and switch port, Excalibur will use separate wire pairs and two ports to support transmission of voice and data to the desktop.

The June announcement date is tentative because AT&T wants to be sure it has the production capacity in order to ensure prompt delivery. AT&T lost some business to competitors because of delivery delays of the System 75 and System 85.

Unlike Excalibur, the System 25 is being developed with the same architecture as the larger System 75. It is intended for branch office or departmental applications where compatibility with AT&T's larger PBXs is important, the source said.

As such, the System 25 will support AT&T's Distributed Communications System for integration with up to 12 other local switches, or electronic tandem networking for geographically dispersed switch networking.

Both will provide the customer transparent access to users supported by remote switches.

The System 25 will also support AT&T's Digital Communications Protocol, which integrates a 64K bit/sec voice channel with another 64K bit/sec data channel and a 16K bit/sec signaling channel.

AT&T's large business sales force would most likely sell the System 25 to its present accounts, the source said, but it may be distributed through the former Bell operating companies if the FCC approves such a marketing arrangement.

Which PBX first?

Different factions within AT&T have been battling over which of these PBXs would be announced first, or whether they will be announced at all, according to the AT&T employee.

The decision to announce Excalibur first may doom further development of the System 25, the source said, because the System 75 is being sold with as few as 40 or 50 stations. While not cheap at that size, the System 75 is still competitive because of the integration features it offers with the top of the line System 85.

"The System 25 is still being developed, but there is a question whether there is a need for it," the source said.

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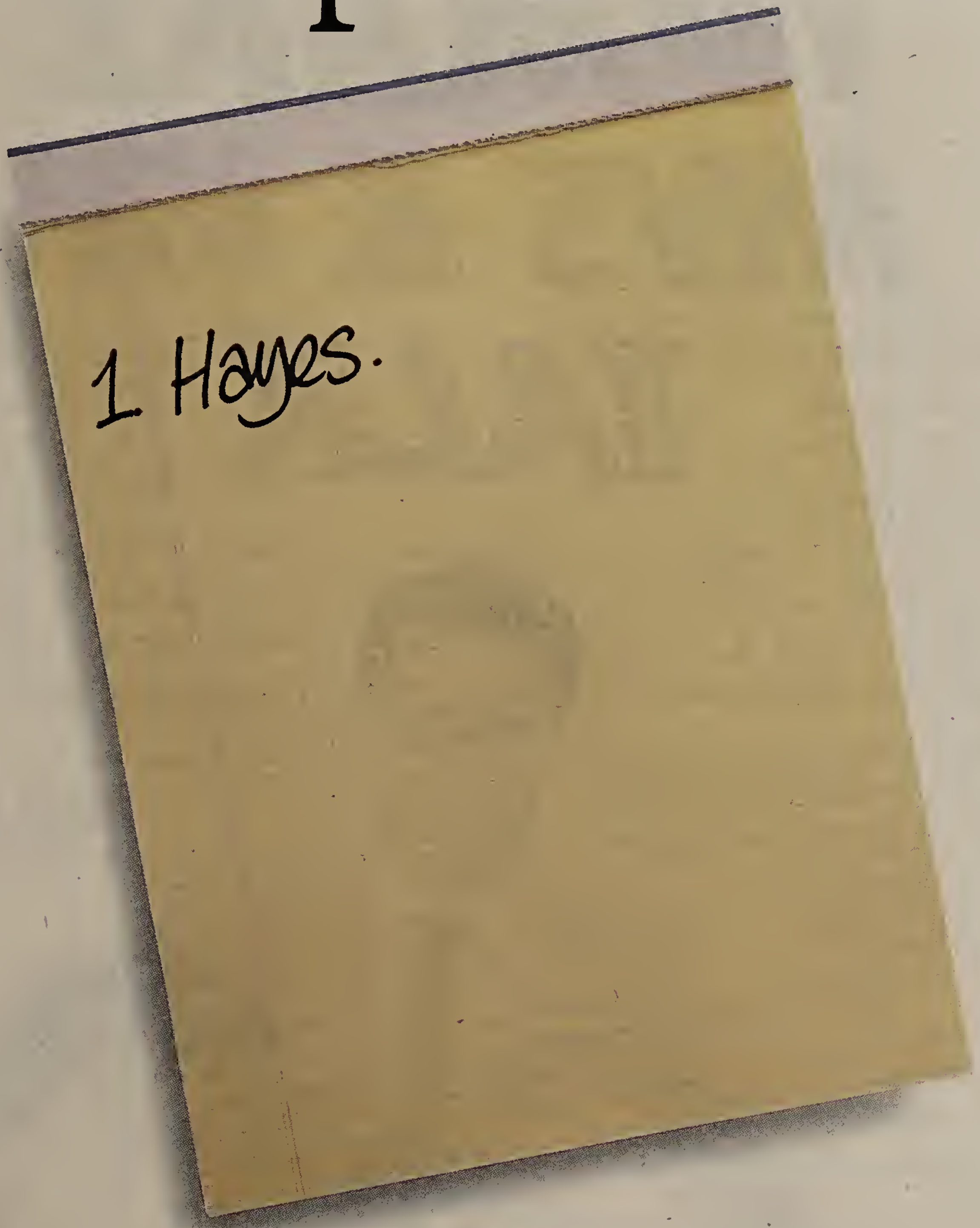
A complete list of things to know about 2400 bps modems.



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